Bank of Canada Review

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SPECIAL ISSUE
CANADIAN CAPITAL MARKETS

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Promissory Note, 1712

During the seventeenth and eighteenth centuries, Canadian merchants used various paper instruments to settle accounts among themselves. Official government issues, like card money, treasury bills, and bills of exchange, were common, but private instruments, such as bank drafts and promissory notes, were used as well. Promissory notes were handwritten promises to pay a sum of money by a specified date to the creditor named in the note. The debtor prepared and signed the document and gave it to the creditor, who kept it until the debt was liquidated, often noting payments received and amounts outstanding on the reverse. The form of the promissory note was not regulated—any piece of paper at hand would do. Sometimes, the intended method of payment, whether cash or a commodity like beaver skins or wheat, was also indicated.

The example shown on the cover was issued in 1712 at Plaisance (Placentia), Newfoundland, the capital of French territory on the island until the area was ceded to English control following the Treaty of Utrecht in 1713. According to the note, a party named Gaulin had borrowed, or received, goods valued at 269 livres, 10 sols, which he promised to pay for by October 1713. The note is made out to the creditors, De Lasson the younger and Dacarrette. The Dacarrette family were well-known entrepreneurs actively engaged in the fishing industry in the early eighteenth century. Michel Dacarrette, one of the most prominent members of the family, was a privateer, a shipowner, and an entrepreneur based at Placentia. He later moved with his brothers to Louisburg on Île Royale (Cape Breton), where he continued operations until he was killed in 1745 during a siege of the fort.

Notations on the face and back of the note indicate that M. Gaulin paid the debt in instalments, using flour valued at a set amount. Flour was an important commodity in New France. In 1711, just one year before this instrument was issued, the governor of New France complained in a letter to the king that returns from the sale of flour were the only source of funds for the colony.

The note measures 28 cm x 16 cm and forms part of the National Currency Collection, Bank of Canada.

Photography by Gord Carter, Ottawa.

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Canadian Capital Markets

Jack Selody, Chair, Editorial Board

The efficient operation of Canada's capital markets is the theme of this special issue. Through each of its responsibilities for monetary policy, the financial system, and funds management, the Bank of Canada has an interest in the efficient functioning of capital markets.

Scott Hendry and Michael King present the Bank of Canada's key findings on this issue in "The Efficiency of Canadian Capital Markets: Some Bank of Canada Research." They conclude that capital markets in Canada are functioning well for a capital market the size of Canada's. They also point to a number of areas where future research can significantly increase our understanding of how capital markets work in Canada.

Stacey Anderson and Stéphane Lavoie focus on a specific area of capital markets in their study, "The Evolution of Liquidity in the Market for Government of Canada Bonds." They use turnover ratios to examine common structural and cyclical factors that affect most sovereign bond markets, including those in Canada. As well, they review recent policy initiatives undertaken by the government to support a liquid and well-functioning market for Government of Canada securities.

Deputy Governor Sheryl Kennedy presents her views on how Canada's capital markets compare in a global context in "Canada's Capital Markets: How Do They Measure Up?" Despite an overall positive assessment, she believes that there is room for improvement and suggests steps that can be taken that will enable Canadian capital markets to remain competitive in the current environment.

On an unrelated but equally important subject, John Chant, Special Adviser at the Bank in 2001–2002, discusses the changing nature of counterfeiting precipitated by recent advances in technology. In "The Canadian Experience with Counterfeiting," he suggests that, although losses from counterfeiting are far less significant than those for other crimes, including credit card fraud, counterfeiting nevertheless poses a special challenge to public confidence in our currency and therefore justifies the substantial expense of the security features found in new Canadian notes.

The Efficiency of Canadian Capital Markets: Some Bank of Canada Research

*Scott Hendry, Research Director, and Michael R. King, Assistant Director, Financial Markets Department**

- *Capital markets transfer funds from savers to borrowers. The degree of efficiency of a market encompasses allocational, operational, and informational efficiency.*
- *The Bank of Canada is interested in the efficient functioning of markets through each of its responsibilities for monetary policy, the financial system, and funds management.*
- *The research conducted by the Bank thus far suggests that Canadian capital markets are efficient for a capital market of Canada's size but are less diverse than the U.S. capital markets, indicating that there is room for improvement in certain areas.*

Capital markets and their related financial instruments make an important contribution to the welfare of Canadians. Canada's equity, bond, foreign exchange, and derivative markets allow households to channel their savings to the productive investments of firms and governments, creating jobs, generating income and returns, and ultimately, fuelling the growth of the economy. Capital markets also provide the means to transfer and manage financial risks, by allowing financial market participants to create diversified investment portfolios or to hedge business risks.

This article highlights the key findings of Bank research published over the past year that addresses capital market efficiency, either directly or indirectly, and summarizes the lessons that have been learned through this research. Market efficiency is a broad topic, and the Bank's research has focused initially on a narrow range of questions. For that reason, the article does not examine other aspects of the financial system; namely, the payments, clearing, and settlement system and the banking system. Nor does it examine issues related to tax policy or accounting on capital market efficiency.

The article has four sections. The first provides a motivation for this research and a definition of market efficiency. The second section reviews the Bank's research under six categories: overall trends, bond markets, equity markets, foreign exchange, securitization and derivatives, and regulation. The third section draws lessons from this research and highlights areas where more research is required. The final section concludes.

* This article is a revised version of a lecture that was delivered to the Canadian Bankers Association in December 2003.

Motivation

The Bank of Canada actively promotes safe, sound, and efficient financial systems, both within Canada and internationally. The Bank is interested in market efficiency because it actively participates in capital markets in the conduct of its main policy functions. As the institution responsible for the conduct of monetary policy, the Bank expects that its changes in the target overnight interest rate will be transmitted through capital markets to yields further along the yield curve. Efficient capital markets contribute to a well-functioning monetary policy transmission mechanism that facilitates the achievement of the Bank's goal of a low and stable rate of inflation to foster long-term economic growth. The Bank views efficient capital markets as playing an important role in distributing risks and reducing the impact of shocks, thereby contributing to financial stability. As fiscal agent for the Government of Canada, the Bank directly participates in fixed-income and foreign exchange markets. Efficient financial markets facilitate the attainment of the government's objective of minimizing debt-issuance costs as well as the costs and risks associated with holding foreign exchange reserves.

Policy-makers have long been concerned with the efficiency of the financial system, whether capital markets, financial institutions, or the clearing and settlement system.[1] The recent focus on financial-stability issues contributed to the development of a rich and extensive body of research on currency crises, contagion, and the impact of globalization on capital markets. This research reinforces the view that efficient capital markets support the stability of the financial system and, therefore, that policy-makers need to promote their development whenever possible. In the past decade, rapid technological change and financial innovations have changed the way capital markets function and have contributed to the growth of cross-border capital flows. In this environment, it is important for central banks and other policy-makers to stay abreast of how these forces are influencing the behaviour and evolution of capital markets.

In this context, the Bank continues to study the efficiency of Canadian capital markets as part of its medium-term research plan.[2] Initial research has been undertaken to establish stylized facts about our capital markets and to arrive at a preliminary assessment of their efficiency. This research acknowledges that Canadian capital markets do not exist in isolation, but form part of a global financial system. Canadian investors and firms are active in international markets, and as a result, the efficiency of our capital markets needs to be viewed in this context. The Bank's research recognizes the importance of this dimension and makes international comparisons where possible. Future research will focus more on the key incentives and constraints facing financial market participants and will identify those aspects of our capital markets where efficiency could be improved.

Market efficiency may be viewed as having three interdependent parts—informational efficiency, transactional (or operational) efficiency, and allocational efficiency.

What is market efficiency?

The role of a capital market is to transfer funds between savers and borrowers efficiently (Copeland and Weston 1991). Efficiency is a key part of this definition, and may be viewed as having three interdependent parts. The first is *informational* efficiency, which is related to the transparency and disclosure of information required to make an investment decision. Capital markets exhibit informational efficiency when financial market participants have all available information about the opportunities and risks involved with different investments. In an ideal world, investors and firms share the same information about investments and, on the basis of the available information, do not fund projects that are expected to be unprofitable. The second part focuses on the cost of allocating these funds, termed *transactional*, or operational, efficiency. A capital market exhibits transactional efficiency when the transactions costs of transferring funds are kept at a reasonable level. The third part is the allocation of funds, termed *allocational* efficiency. In theory, a capital market exhibits

1. In December 1996, for example, the Canadian government established a Task Force on the Future of the Canadian Financial Services Sector to make recommendations on policies to enhance the competitiveness and effectiveness of financial institutions. The Task Force published its report, known as the MacKay Report, and supporting studies in 1998 (Canada 1998).

2. We use the term Canadian capital markets broadly to refer to bond and equity markets located in Canada, and the related foreign exchange and derivative markets.

allocational efficiency when firms with profitable investment opportunities (i.e., projects that have a positive net present value) are able to fund these projects, thereby creating the conditions for economic growth. In other words, investors will alter the risk-adjusted rate of return such that, in equilibrium, the present value of future earnings generated by the marginal project equals zero.

These three measures of efficiency are inter-related, with allocational efficiency contingent on informational and transactional efficiency. For example, poor disclosure of information and greater uncertainty (i.e., low informational efficiency) may cause investors to increase the risk premium embedded in their required rate of return, raising the cost of capital for firms. As costs rise, investment projects that appeared profitable under a lower cost of capital may now go unfunded, resulting in an inefficient allocation of funds across projects relative to an environment with high informational efficiency. For their part, market-makers and other financial intermediaries that perceive they are trading against better-informed investors may be less willing to take on risk, leading to lower liquidity and wider bid-ask spreads (i.e., low operational efficiency). In this environment, there are dead-weight costs to society, and economic growth is lower than it could be. These examples show that the three sorts of efficiency are related, and inefficiency in one area contribute to inefficiency in another area.

Bank of Canada Research

Overall financial trends

Freedman and Engert (2003) provide a broad overview of the changing pattern of financing in Canada over the past thirty years in a *Recent* review article. In this survey of the trends and challenges presented by developments in the financial sector in Canada, the authors examine the relative roles of financial institutions and capital markets, the types of financial instruments used, how borrowing mechanisms have changed over time, and the challenges facing the Canadian financial sector.[3] They document the increasing importance of public debt markets relative to loan markets from 1975 to 1995, largely owing to increased government borrowing. By the end of the 1990s, the proportion of finance from equity and bond markets was broadly similar to what it was thirty years earlier. Asset securitization of mortgages and consumer credit has risen sharply as a percentage of total credit over the latter part of the 1990s, but remains at about half the corresponding level in the United States. The development of securitization suggests that Canadian capital markets are providing better risk-management tools and access to cheaper funding.

Given the significant borrowing by Canadian corporations in U.S. bond markets and the large number of corporations that are cross-listed in U.S. equity markets, the authors consider whether Canadian capital markets have been hollowed out or abandoned by Canadian firms. They conclude that the data do not provide much support for that view. The share of Canadian-dollar borrowing by Canadian corporations has remained at around 50 per cent since the mid-1980s, suggesting that Canadian capital markets have remained competitive internationally. Foreign placements of net new Canadian equity issues have averaged 12 per cent of new issues in the last half of the 1990s, suggesting that needs of Canadian firms for equity capital are being met domestically. The authors do highlight that asset securitization and the high-yield bond market for lower-rated borrowers have not developed to the same degree as in the United States. More research is required to understand the different trajectories between Canadian and U.S. capital markets and the implications for Canadian capital market efficiency.

Given the significant borrowing by Canadian corporations in U.S. bond markets and the large number of corporations that are cross-listed in U.S. equity markets, the authors consider whether Canadian capital markets have been hollowed out or abandoned by Canadian firms.

Canadian-dollar bond market

The Canadian-dollar bond market was $875 billion at year-end 2003, representing 72 per cent of Canadian gross domestic product (GDP) and 1.5 per cent of the world bond market (Merrill Lynch 2004). In contrast,

3. Dolar and Meh (2002) note that financial structure does not explain different growth rates across countries. What matters for growth is the overall level and quality of financial services. Capital markets and intermediaries are not substitutes for each other, but rather complement one another in channeling savings to productive uses. Both contribute to long-term economic growth.

the U.S. bond market represented close to 200 per cent of U.S. GDP and 47.6 per cent of the world bond market, and the U.K. bond market represented 75 per cent of U.K. GDP and 3.3 per cent of the world bond market.

One major change that has contributed to the informational efficiency of Canadian-dollar bond markets is the change in the conduct of monetary policy. In December 2000, the Bank launched a new system for regularly announcing its decision regarding the key policy rate, the overnight rate of interest. The Bank introduced a system of fixed announcement dates (FADs) designed to reduce uncertainty about monetary policy and to increase transparency regarding interest rate decisions. A number of studies provide evidence that these objectives have been met. Parent, Munro, and Parker (2003), in an article evaluating the effects of the FADs, find that they have improved the capital markets' understanding of the broad direction of monetary policy and of the rationale behind the Bank's policy decisions. Parent (2002–2003) studies the price reaction of short-term interest rates to the release of macroeconomic data and changes in the overnight rate. Whereas 2-year interest rates and 3-month bankers' acceptance futures (BAX) contracts responded primarily to U.S. economic releases prior to the adoption of FADs, these financial instruments now respond to Canadian macroeconomic data (although some U.S. releases continue to be important). The changing focus on Canadian, as opposed to U.S., macroeconomic data suggests that financial market participants have a better understanding of how monetary policy affects the Canadian yield curve. Short-term interest rates are more informationally efficient. The study also finds that unanticipated changes to the target overnight rate cause a rapid price reaction in BAX futures on the day of the announcement as participants adjust their short-term expectations. The yield on 2-year interest rates, however, does not respond, suggesting that monetary policy is less uncertain and that capital markets have more stable medium-term expectations for monetary policy.

Johnson (2003), in an article on measuring interest rate expectations in Canada, examines how information about monetary policy is reflected in the price of various short-term financial instruments. When markets are efficient, expectations about the future path of the overnight rate should be reflected in the prices of BAX contracts, term purchase and resale (repo) agreements, and foreign exchange forward contracts. Johnson outlines a methodology for extracting implied forward rates from these securities and tests the efficient-market hypothesis over 1- and 3-month horizons. The results of the analysis indicate that the predictive power of BAX contracts and other instruments increased markedly in the period following the adoption of FADs, while the volatility of these instruments declined. This suggests that the increased transparency achieved under the FAD regime has improved the efficiency of the pricing of short-term assets.

Government of Canada bond market

Marketable bonds issued by all levels of government represent 65 per cent of the Canadian-dollar bond market and 47 per cent of Canadian GDP. In contrast, U.S. government debt makes up roughly half of the U.S.-dollar bond market (or 95 per cent of U.S. GDP), and U.K. government debt represents 37 per cent of the U.K. pound sterling bond market (or 28 per cent of U.K. GDP) (Merrill Lynch 2004). Canada's federal govern-ment had close to $300 billion in marketable bonds outstanding at the end of 2003 and an additional $117 billion in short-term treasury bills.

A significant proportion of the trading of Government of Canada bonds in secondary markets is transacted through the interdealer broker market, which is the subject of a study by D'Souza, Gaa, and Yang (2003). Using a unique database of interdealer broker trades, the authors empirically measure liquidity in the Canadian bond market on the basis of several indicators. Liquidity may be measured using the bid-ask spread, the depth or size that may be transacted at posted prices, the immediacy with which orders are filled, and the adjustment of prices following a trade. The authors find that Canadian interdealer broker market is relatively liquid for its size when compared with the same market in the United States. Canadian dealers post relatively small quote sizes in relation to typical trade size, however, and make greater use of the order-expansion protocol (known as the "workup") than dealers in U.S. interdealer broker markets. In a workup, dealers post an initial quote for a small trade size. When a quote is hit or lifted, the workup allows further negotiation over the size of the trade to take place between counterparties.[4] Once the trade has been initiated, other participants in the system are alerted and may trade at the same price. This process provides a means for traders to execute transactions in larger sizes while reducing the impact of the trade on prices. While this practice is generally found in a market where there is informational asymmetry, the authors

4. In market parlance, a bid quote to buy is "hit" and an ask quote to sell is "lifted."

observe no consistent link between the frequency of its use and observations of trading activity, market liquidity, or price volatility. Instead, they argue that using a workup allows dealers to strategically time their participation to take advantage of intermittent price discovery. The order-expansion protocol contributes to allocational and transactional efficiency.

In an extension of their earlier work, D'Souza and Gaa (2004) examine the impact of information on the volatility of prices, trading activity, and liquidity in the interdealer market for government bonds. They find that liquidity decreases for the five minutes before and after a macroeconomic news announcement but then increases significantly for up to thirty minutes after that. In contrast, on government debt auction days, liquidity increases before the auction cut-off time as dealers trade on the information derived from their customer order flow. After this, liquidity tends to decline around the time that auction results are released before returning to normal levels shortly thereafter. In general, the authors conclude that dealers are less willing to make markets during times when prices could shift sharply. These market dynamics are similar to the behaviour predicted by theory and observed in the much larger U.S. government-debt markets. The general conclusion is that information is processed in the Canadian government bond market in an efficient and timely manner.

The general trend of liquidity in the secondary market for Government of Canada bonds is investigated in the article by Anderson and Lavoie (2004, this issue). The authors find that liquidity, as measured by the turnover ratio, has exhibited considerable variation over the past decade but has remained healthy. Its evolution has not been out of line with that of other sovereign bond markets. The authors attribute much of the variation to cyclical factors, including changes in the interest rate environment and investors' appetite for risk, as well as the increase, and subsequent sharp decline, in equity prices. They find that longer-term trends, both structural and policy related, also have important effects on the liquidity in sovereign bond markets. These influences include the rate of adoption of financial and technological innovations as well as the level of government borrowing and debt-management initiatives.

Corporate bond markets

The corporate bond market has grown steadily over the past decade, and now represents 23 per cent of the Canadian-dollar bond market. The equivalent market represents 30 per cent and 10 per cent of the U.S.-dollar and U.K.-pound sterling bond markets, respectively (Merrill Lynch 2004).[5] Freedman and Engert (2003) examine the borrowing behaviour of Canadian corporations over the past twenty-five years and find that around half of the outstanding issues were denominated in Canadian dollars. As a percentage of GDP, Canadian-dollar corporate bonds rose steadily as federal government debt declined. Factors influencing the decision to borrow in U.S. dollars include the ability of the U.S. market to absorb larger issue sizes, the availability of longer terms to maturity, natural hedges for exporters, and access to capital for lower-rated borrowers.

Anderson, Parker, and Spence (2003) provide more recent data on corporate borrowing in their study of the development of the Canadian corporate debt market. The average size of Canadian-dollar-denominated issues was about half the size of U.S.-dollar-denominated bond issues, which the authors ascribe to the smaller average size of funds under management by Canadian asset managers. Larger issue sizes in the United States are associated with lower distribution costs, improving transactional efficiency. The most active Canadian issuers of U.S.-dollar-denominated debt were financial institutions and resource companies. In the recent period, telecommunications firms were active borrowers of U.S. dollars because of the limited supply of funds for lower-rated borrowers in Canada, owing to single-name exposure limits. The authors argue that ready access to the U.S.-dollar bond market serves as a valuable supplement to the Canadian-dollar bond market. In light of these findings, more research is needed to examine the access to, and cost of, capital for lower-rated Canadian corporations.

Equity market

Equity capital markets are unarguably the most visible and transparent part of the Canadian financial system. Together, the Toronto Stock Exchange (TSX) and the TSX Venture Exchange had a market capitalization of $1,215 billion at year-end 2003, representing 98 per cent of GDP. In comparison, the market capitalization of the three main U.S. exchanges—the New York Stock Exchange (NYSE), the NASDAQ, and the American Stock Exchange—was U.S.$14,266 billion at year-end 2003, representing about 130 per cent of U.S. GDP. Similarly, the market capitalization of the London Stock Exchange

5. These figures do not include eurobond issues and foreign currency-denominated issues.

was U.S. $2,426 billion at year-end 2003,representing 79 per cent of U.K. GDP.

King and Segal (2003a) explore the relative attractiveness of these markets for Canadian firms in a comparative study of the valuation of Canadian and U.S.-listed equity. The authors examine how the book-to-market and earnings-to-price multiples assigned to the equity of Canadian firms compare with the equity of comparable firms listed in the United States. They find that Canadian firms are valued at a discount to their U.S. peers across a range of valuation measures. Differences in accounting do not explain this discount, based on a comparison of Canadian cross-listed firms that report under both Canadian and U.S. generally accepted accounting principles. This valuation discount exists despite Canadian-listed firms having a lower historical cost of equity and higher profitability than comparable U.S-listed firms. Part of the difference in valuation is explained by company-specific factors, such as industry membership, firm size, cost of equity, and profitability. The authors find that characteristics of the stock market where the share is listed affect valuation, such as secondary market liquidity and the relative performance of the overall equity market. They conclude that a country discount still persists after controlling for these firm-specific and market-specific factors, which suggests that Canadian and U.S. financial markets remain segmented.

International cross-listing

One response to the segmentation of the Canadian equity market has been the rise of international cross-listing. Canadian firms make up the single largest group of foreign firms listed on U.S. stock exchanges, with more than 180 Canadian firms cross-listed on the NYSE, the American Stock Exchange, or the NASDAQ at year-end 2003. Chouinard and D'Souza (2003-2004) discuss the global trend towards international cross-listing. They report that the practice indicates the desire of managers to overcome market segmentation, to reduce their cost of capital, and to access a larger group of investors. The growth in cross-listing has reflected a growing realization of its benefits, the impact of technological changes, and the liberalization of capital flows. Roughly 15 percent of the TSX-listed firms have a U.S. listing, and another 2 per cent have a listing on the London Stock Exchange. Trading on U.S. exchanges accounts for 40 to 50 per cent of trading volume in these issues, on average. Surveys of Canadian corporate managers find that access to a broader investor base and increased marketability of a firm's securities are the main benefits of cross-listing, while compliance with foreign reporting requirements is cited as a major cost. Empirical studies of international cross-listing find that cross-listing reduces transactions costs through an improvement in market liquidity, improves the accuracy of analyst earnings forecasts, and increases valuations.

King and Segal (2003b) explore some of the motivations and implications of cross-listing in a study of the relationships between corporate governance, international cross-listing, and U.S. investor home bias. Corporate governance is defined as the ways in which the suppliers of finance to corporations assure themselves of getting a return on their investment, through monitoring by boards of directors and independent auditors and the existence of securities regulation and corporate laws. The passing in the United States of the Sarbanes-Oxley Act of 2002 following the collapse of Enron and WorldCom highlighted the importance of these mechanisms for protecting investors. U.S. investors have shown a reluctance to diversify their equity portfolios outside of U.S. markets, leading to a greater concentration on domestic holdings than theory would suggest is optimal. This home bias is linked to informational asymmetry, as the quality of disclosure in foreign countries (or timeliness) and legal recourse may be lower than in the United States. A second explanation argues that concentrated corporate ownership may discourage U.S. investment, as minority shareholders are at an informational disadvantage relative to controlling shareholders. Canada features more concentrated ownership than the United States, with a greater prevalence of family-owned firms and greater use of multiple classes of shares (Attig, Gadhoum and Lang 2002; Morck, Stangeland, and Yeung 2000).

King and Segal consider how cross-listing on a U.S. exchange may affect the level of investor protection and overcome the home bias of U.S. investors. The study compares the valuation of Canadian firms listed exclusively in the domestic market with Canadian firms cross-listed on a U.S. stock exchange, including a set of firm-specific and market-specific variables to control for other factors known to affect valuation. They find that cross-listing reduces the discount between Canadian firms and their U.S. peers, which may be owing to the increased transparency and greater scrutiny that follows a U.S. listing. Cross-listing does not, however, eliminate the country-specific discount because the Canadian firms continue to be valued at a discount relative to their U.S. peers.

Income trusts

One of the major growth areas in Canadian equity markets over the past five years has been the income trust sector. This asset class, and the issues affecting it, is the subject of a paper by King (2003). An income trust is an investment vehicle that distributes cash generated by a set of operating assets in a tax-efficient manner. The market capitalization of income trusts surpassed $45 billion at year-end 2002, with this segment representing 7 per cent of the value of the TSX. The market capitalization of this sector was approaching $90 billion as of mid-2004. The sharp rise of income trust valuations, the large supply of new issues, and the complexity of their legal structure have increased scrutiny of this asset class. King outlines the sources of growth of the income trust sector, the structure of a typical income trust, and the key drivers for valuation. The benefits of income trusts and the issues related to investment are elaborated, focusing on legal and regulatory issues, corporate governance, operational issues, and market issues.

The development of the income trust sector shows that Canadian capital markets are evolving to meet the needs of companies and investors. Companies have successfully sold a wide variety of assets by transferring these assets into an income trust structure. This activity has encouraged the flow of investment capital to projects with positive rates of return. Investors have been offered a new investment vehicle that pays high cash returns. By returning cash flows to investors, income trusts allow investors to decide how best to allocate these funds rather than leaving them in the hands of management. The rapid growth in a low interest rate environment and increased valuation of this asset class have raised concerns that these assets may be overvalued. The author argues that the capital markets appear to be addressing these concerns, as investors become more knowledgeable about the benefits and uncertainty of different business models and allocate their funds appropriately. Regulators are looking at ways to increase disclosure and transparency in this market, while the liability issues are being addressed by provincial governments in several jurisdictions.

Foreign exchange market

The Canadian dollar is the sixth most actively traded currency in the world, although it only represented about 2 per cent of daily turnover in global foreign exchange markets in 2001, an increase from 1.2 per cent in 1998.[6] Given increased globalization, Canadian firms that are active abroad may choose between the Canadian dollar and other currencies, notably the U.S. dollar, as a medium of exchange, store of value, and unit of account. Murray and Powell (2002) and Murray, Powell, and Lafleur (2003) examine this issue in a review of the extent of de facto "dollarization" in Canada. The authors describe a special survey of the payment and financial-reporting practices of Canadian firms conducted by the Bank's regional offices to determine whether the U.S. dollar has started to displace the Canadian dollar as a preferred unit of account. A cross-section of firms were asked what currency (or currencies) they used for quoting sales to Canadian customers, for quoting prices to foreigners, for reporting their financial results, and for quoting salaries and wages. The data indicate that, despite the dominance of the U.S. dollar in world trade and as an international standard of value, use of the U.S. dollar in Canada is very limited. The vast majority of Canadian firms price their products and keep their financial statements in Canadian dollars, and very few workers in Canada have their salaries paid in a foreign currency. The report concludes that the Canadian dollar is still strongly preferred for most pricing and financial-reporting activities in Canada, and there is very little evidence of de facto dollarization.

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The Canadian dollar appreciated by 16 per cent in real terms relative to the U.S. dollar in 2003, raising questions about its impact on corporate profits, corporate credit quality, and, ultimately, the financial system

6. Data are taken from the Table E.1.1 of the BIS triennial survey on foreign exchange market activity and are adjusted for double-counting (BIS 1999, 2002). In 2001, the most actively traded currencies in the spot market (and their share of daily average turnover) in order of priority were the U.S. dollar (42.2 per cent), the euro (21.5 per cent), the Japanese yen (13.0 per cent), the U.K. pound (5.4 per cent), the Swiss franc (3.5 per cent), and the Canadian dollar (2.0 per cent).

more generally. In January 2004, the Bank sent the major financial institutions active in the Canadian-dollar market a questionnaire that focused on the foreign exchange hedging activities of their corporate customers. The results are summarized in Bank of Canada (2004). The chartered banks estimate that, on average, their clients have a benchmark target hedge ratio of approximately 50 per cent, albeit with wide variation among firms. Actual hedge ratios at various firms would typically be above or below their benchmark target, at least partly reflecting these firms' views on future currency movements. Most "natural" hedges, such as the location of production facilities or the use of offshore funding sources, are long-term in nature and do not change in response to short-term currency movements. Financial institutions indicated that new Canadian accounting standards governing the reporting of derivatives, enacted in July 2003, may make it more difficult for their clients to attain "hedge" accounting status (that is, cost- or accrual- accounting treatment) for their currency hedges. The responses suggest that the requirement to record derivatives at market value may discourage some firms from hedging their foreign exchange risk, since it increases the volatility of the firm's earnings.

Derivative markets and asset securitization

Derivatives and asset securitization, which are securities whose value is based on price movements of an underlying asset or a pool of assets, respectively, have been growth areas in international capital markets. The Bank for International Settlements (BIS) estimates that the notional amount of over-the-counter (OTC) foreign exchange derivatives totalled U.S.$20.4 trillion in June 2001, an increase of 56 per cent since March 1995 (BIS 2002). The notional amount of OTC single-currency interest rate derivatives increased by 184 per cent, to U.S.$75.8 trillion, over the same period. The fastest growth occurred in the area of OTC equity-linked derivatives, where the notional amount outstanding increased by more than 250 per cent, to U.S.$2.0 trillion over this period. While the BIS "does not provide a breakdown of notional amounts by country, it does provide a breakdown of daily average turnover. In 2001, Canada had a 2.8 per cent market share of turnover in OTC foreign exchange derivatives (up from 2.0 per cent in 1998), and a 1.5 per cent share of turnover in OTC single-currency interest rate derivatives (down from 1.9 per cent in 1998) (BIS 2002).[7] Figures for equity-linked derivatives are not available.

Kiff (2003) provides an overview of some of these markets in a survey of recent developments in the markets for credit-risk transfer. Credit-risk transfer (CRT) instruments allow counterparties to transfer exposure to the risk of default without transferring ownership of the underlying asset. Asset-backed securities (ABS), for example, are used to securitize the cash flows from assets such as residential mortgages, commercial paper, credit cards, auto loans, and equipment leases. ABS make up the bulk of CRT activity in Canada. The domestic market for other types of CRT instruments is quite small. For example, Freedman and Engert (2003) report that 11 per cent of Canadian mortgages are securitized, compared to about 50 per cent in the United States. Toovey and Kiff (2003) provide details on the most active segment of the CRT market, the market for asset-backed commercial paper (ABCP), which totalled $64 billion at year-end 2002. This segment has grown considerably since the mid-1990s and accounts for about 40 per cent of the market for short-term corporate paper. This form of securitization is attractive, since it provides firms with an alternative source of funding, potentially at a lower cost than such traditional sources as commercial paper and bankers' acceptances. The authors conclude that there is little doubt that CRT instruments increase market efficiency and the dispersion of risk but, in doing so, they create other potential risks and problems.

For example, the BIS has identified lack of disclosure at the entity level and at the deal level as an area of concern that may require a policy response from regulatory authorities. Transaction details, such as details of the asset pool as well as credit and liquidity enhancements, are not readily available. The BIS expressed concerns regarding the reliance on rating agencies, the concentration of activity among a few financial intermediaries, the potential for greater volatility in the underlying assets, legal risks related to the structuring of these instruments, and the incentive problems these instruments create among borrowers and lenders. Kiff (2003) notes that the disclosure and transparency in CRT instruments seems low. Toovey and Kiff (2003) note that the current disclosure of transaction details in Canadian ABCP leaves much to be desired, including information that reveals the extent to which risk has

7. In comparison, the United States had a 14.3 per cent share of turnover in OTC foreign exchange derivatives and a 17.1 per cent share of turnover in OTC single-currency interest rate derivatives in 2001. The United Kingdom had a 32.9 per cent and a 35.2 per cent share, respectively (BIS 2002).

actually been transferred by the originator and where it has gone. This area will require ongoing monitoring and analysis in Canada and abroad. In particular, research should address where the risks are being concentrated, and how the stability of the financial system is being affected.

Securities-market regulation

Well-designed securities-market regulation, by increasing transparency and reducing uncertainty, can contribute to market efficiency. Greater informational efficiency should lower the cost of capital, encourage investment, increase liquidity, and reduce counterparty risk. For many years now, there has been discussion as to the optimal form of securities-market regulation in Canada. As part of this debate, the federal government commissioned a study, published in 2003 as the Wise Persons' Committee report (Canada 2003a, b), which recommends the creation of a single regulator for Canadian securities markets that would be overseen by federal and provincial governments. Alternative recommendations have been made by various provincial regulators, and the debate over the optimal regulatory structure for Canadian securities markets is continuing. Many financial market participants suggest that there is room for improvement in the Canadian system of regulating securities markets in terms of reducing the regulatory burden and improving enforcement (Canada 2003a).

The relationship between regulation, transparency, and the quality of fixed-income markets has long been of interest to the Bank. In February 2004, the Bank hosted a workshop with guests from Canada, the United States, and Europe that brought together market participants and regulators to debate this topic from an international perspective. The major themes are summarized in Zorn (2004). Transparency in financial markets refers to the amount of information that is released regarding quotes, prices, and volumes in a market, as well as the immediacy with which this information is disseminated. Transparency contributes to informational efficiency in the market, although full disclosure may reduce the willingness of market-makers to bear risk, as highlighted in Vu (2003). The general opinion of the workshop was that the optimal degree of transparency for a market depends on the institutional characteristics of that market. The participants agreed that the Canadian fixed-income markets do function well overall, but that improvements could be made by increasing transparency. The benefits of increased transparency would primarily accrue to smaller institutional and retail investors. Any regulatory developments need to be well planned, implemented in steps, and evaluated thoroughly before proceeding to the next phase. Such a gradual approach will ensure that each market moves towards its appropriate level of transparency without unduly harming liquidity and risking the perverse effect of reducing rather than improving market efficiency.

Lessons Learned

What have we learned from this body of research about the efficiency of Canadian capital markets? We summarize our conclusions using the three-part definition of market efficiency; namely, allocational efficiency, transactional efficiency, and informational efficiency.

Allocational efficiency

The Bank's research thus far suggests that Canadian capital markets appear to be relatively efficient for a country the size of Canada, but are less diverse than the larger U.S. capital market. The public and private sector appear able to raise sufficient funds in Canada, although this conclusion is based on research that has focused principally on the public-market activities of the largest Canadian firms.[8] In cases where the size of Canada's capital market may act as a constraint, Canadian firms have found ways to address the potential allocational issues by accessing international capital markets. Canadian firms are issuing about half of their corporate debt in U.S. markets to accommodate large issues sizes, to lower their cost of funds, or to hedge their U.S. dollar-denominated revenues and assets. In cases where the needs for capital were large, certain lower-rated Canadian firms, such as telecommunications firms in the late 1990s, have raised funds in the U.S. high-yield market, which is more developed than the market for these firms in Canada. Similarly, Canadian firms that cross-list on a U.S. exchange may lower the cost of capital and increase their valuation while increasing their visibility and their share turnover. These U.S. offerings are concentrated among Canada's larger corporations that have a greater need for funds than may be available at a reasonable price in the smaller Canadian capital market. As such, there seems to be allocational efficiency for large firms.

8. The MacKay Report highlighted the lack of data on the financing of small and medium-sized enterprises (Canada 1998). This gap is being addressed by Statistics Canada through the creation of a new survey, the Survey on Financing of Small and Medium-Sized Firms, first administered in 2000.

The Bank's research thus far suggests that Canadian capital markets appear to be relatively efficient for a country the size of Canada, but are less diverse than the larger U.S. capital market.

Smaller or lower-rated Canadian corporations may face obstacles to issuing debt in the Canadian and U.S. corporate bond markets, but they may be funding their investments through loans from Canadian financial institutions, venture capital, or private placements. These alternative sources of funds and their relative costs require further study to determine whether there truly is allocational efficiency for these firms. Future research should address whether the state of this market reflects inadequate supply or a lack of demand from investors.

The emergence of new asset classes in Canadian capital markets, such as income trusts, have allowed Canadian companies to raise funds to pay down debt or to invest in new business opportunities. This activity contributes to both allocational and operational efficiency in the Canadian market by reducing the cost of capital and expanding the set of projects for which funding can be obtained. The development of ABCP is another means to raise capital through securitization without selling the underlying assets. The concentration of CRT activity in ABCP, however, belies the fact that the securitization of assets and the use of other credit derivatives remains limited in Canada.

Overall, the picture that emerges is one of a capital market that has adapted and developed mechanisms or securities to maximize allocational efficiency. Still, the prominent use of U.S. capital markets by Canadian firms suggests that access to global sources of capital is also important for Canadian firms. Future research will investigate the development of the derivatives market in Canada and how we rank relative to other countries in terms of the completeness of this market.

Transactional efficiency

Few of the studies discussed in this article address transactional efficiency directly. One exception is the study of the Government of Canada bond market that found that bid-ask spreads and other measures of liquidity were reasonable for a market of Canada's size, but indicate lower levels of liquidity than in the U.S. market. Transactions costs related to price impact, for example, are reduced by the use of the order-expansion protocol in the interdealer broker market. Liquidity in Government of Canada bond markets is good, although there are still some factors—such as narrower derivative and ABS markets, and the slower introduction of electronic trading platforms—that could be limiting transactional efficiency in Canada's bond market.

Other studies allow indirect inferences about transactional efficiency to be drawn. Increased competition for Canadian equity listings and for the trading of Canadian cross-listed firms has led to narrower bid-ask spreads and greater liquidity for these securities, although some evidence suggests that these benefits are not present for the securities of non-cross-listed firms (Eun and Sabherwal 2003; Foerster and Karolyi 1998). No studies have been done of the transactions costs in corporate bond or derivative markets, because of the lack of reliable trading data on these securities. Canadian issuers have indicated that a primary motivation to issue U.S.-dollar-denominated debt is the lower transactions costs due to larger issue sizes and the greater number of asset managers in the United States. The development and rapid growth of the income trust market suggests that Canadian capital markets have found a flow-through vehicle that minimizes corporate income tax, allowing income trusts to pay out more cash flow than similar assets held in corporate form.[9] Taken together, these studies suggest that transactional efficiency is highest for Government of Canada bonds and the equity of cross-listed Canadian firms. More research on the other capital markets is needed to reach a conclusion on transactional efficiency in other areas.

One factor of the financial market landscape that contributes to transactional efficiency is the regulatory environment. The Bank remains keenly interested in how regulation affects transactions costs and the cost of capital in Canadian capital markets and, hence, the degree of transactional efficiency. The Bank will continue to monitor developments in financial market regulation as it seeks to understand the role of the regulatory framework in influencing the degree of market efficiency.

9. More details on how the Canadian tax system creates an uneven playing field for different economic claims are discussed in Hayward (2002).

Informational efficiency

Studies suggest that the adoption of fixed announcement dates has increased the informational efficiency in the short end of the Government of Canada yield curve, as financial markets have a better understanding of how monetary policy is formulated and implemented. The general opinion at the Bank's recent workshop on regulation and transparency was that improving transparency and increasing disclosure would be beneficial for the Canadian bond market. The research conducted to date, however, suggests that there are potential informational-efficiency issues in the corporate bond market, the income trust market, and the market for CRT instruments. In the area of CRT instruments, research conducted by both the Bank and the BIS suggests that information is lacking on the extent to which risk has actually been transferred by the originator, and where this risk has gone. Monitoring of CRT by Standard & Poor's, Moody's International, and DBRS Inc. is addressing some of these issues. It would be useful to examine how regulating greater disclosure might affect the valuation and required return of these assets.

The research conducted to date . . . suggests that there are potential informational-efficiency issues in the corporate bond market, the income trust market, and the market for CRT instruments.

Studies conducted both inside and outside the Bank suggest that informational asymmetry remains an issue in Canadian equity markets. Bank research on the valuation of Canadian firms suggests that the greater scrutiny of U.S. equity markets increases valuations of cross-listed firms. Cross-listing may increase a firm's valuation but does not eliminate the country-specific factor that leads to the discount of some Canadian firms relative to their U.S. peers. One possible explanation is that the concentrated corporate ownership of many Canadian firms may lead U.S. investors to conclude that minority investors have an informational disadvantage. This hypothesis needs to be studied in future research. Externally, academic studies document the price increases of Canadian takeover targets ahead of the first public announcement (Jabbour, Jalilvand, and Switzer 2000) as well as the failure of many Canadian firms to meet regulatory requirements when buying back their shares (McNally and Smith 2003). In addition, the report of Canada's Insider Trading Taskforce (2003) on information leakage found evidence of important informational inefficiencies.[10]

Conclusion

Overall, the Bank's research conducted thus far suggests that Canadian capital markets appear to be well functioning and efficient for a capital market of the size of Canada's. Canadian markets are developing to match the needs of savers and investors, and the overall growth of Canadian capital markets has kept pace with the economy. Canadian markets are maintaining their market share in the global competition for the business of Canadian firms. New asset classes, such as income trusts and ABCP, have emerged to address the needs of firms and investors. More research is needed to examine how Canadian capital markets are addressing the needs of smaller firms, as well as lower-rated firms. Future research should examine the level of transparency and disclosure in different asset classes, and how changes to these levels affect asset prices. Policy-makers need to continue to study the impact of financial innovation, particularly in the areas of securitization, derivative markets, and electronic trading systems. More research is required to identify areas where Canada has a competitive advantage in a world of global capital, and areas where we are lagging and need to improve. Certain segments of Canadian capital markets have developed differently than comparable segments in the U.S. capital markets, and understanding the forces behind these differences will be important for isolating the strengths and weaknesses of Canadian capital markets. In this regard, an important issue will be to determine the appropriate benchmark against which to measure the efficiency of Canadian capital markets. The Bank will continue to explore these questions as part of our ongoing research efforts.

10. In September 2002, the Ontario, Québec, British Columbia, and Alberta securities commissions combined with the Investment Dealers Association of Canada, the Bourse de Montréal, and Market Regulation Services Inc. to form the Insider Trading Task Force. The Task Force's objective was to evaluate how best to address illegal insider trading in Canadian capital markets. The full report is available at www.csa-acvm.ca/pdfs/ITTF_report.pdf.

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The Evolution of Liquidity in the Market for Government of Canada Bonds

*Stacey Anderson and Stéphane Lavoie, Financial Markets Department**

- *Liquidity in the secondary market for Government of Canada bonds, as measured by the turnover ratio, has exhibited considerable variation over the past decade but has remained healthy. Its evolution has generally been in line with that of other sovereign bond markets.*
- *Much of the variation can be attributed to cyclical factors, including changes in the interest rate environment and investors' appetite for risk, as well as developments in equity markets in the late 1990s.*
- *Longer-term trends, both structural and policy related, also have important effects on the liquidity in sovereign bond markets. These influences include the rate of adoption of financial and technological innovations, as well as the level of government borrowing and debt-management initiatives.*

Market liquidity is an abstract and multifaceted concept that is affected by numerous cyclical, structural, and policy-related factors. Although it is difficult to measure, liquidity in government bond markets is of interest to policy-makers because of the many different functions these markets fulfill within the financial system.[1] First, and most importantly, securities markets provide governments with financing. In addition, government bonds are widely used to price and to hedge other types of securities, since they are generally considered to be risk-free assets.[2] These securities are also used as collateral for various financial transactions and as a source of liquidity to cover unexpected cash outflows.[3] Furthermore, fixed-income markets play a critical role in the implementation of monetary policy, as they are a key vehicle through which the effects of monetary policy are transmitted to the economy and, ultimately, to inflation. They also provide policy-makers with a source of information on financial markets' interest rate expectations.

A liquid secondary market for government securities supports the effectiveness of these functions. The

* We thank Tony Kim for his assistance in collecting and compiling the data used for this article.

1. The terms "government bond market" and "sovereign bond market" will be used interchangeably throughout the article.

2. Schinasi, Kramer, and Smith (2001) suggest that other markets could assume this and other roles historically fulfilled by government securities should the amount of government debt outstanding decline significantly.

3. In recent years, there has been a growing acceptance of other securities as collateral (BIS 2001). Since November 2001, the list of assets accepted as collateral by the Bank of Canada for loans given to participants in the Large Value Transfer System (LVTS) has been expanded and now includes private sector assets such as bankers' acceptances, commercial paper, and corporate bonds.

liquidity premium required by investors to hold government securities is typically smaller in more liquid markets, which contributes to a lower financing cost for the government and less price distortion. Securities prices in liquid markets respond to new information more quickly and thus facilitate the implementation of monetary policy. Finally, transactions costs are generally lower in liquid markets, contributing to better allocation of capital.

The purpose of this article is to describe the recent evolution of liquidity in various secondary government bond markets, with particular emphasis on the market for Government of Canada (GoC) securities, and to discuss the principal influences that might be at the root of these developments. It updates and expands upon the discussion by Gravelle (1999b) in a previous *Bank of Canada Review* article.[4]

The article is structured as follows. First, liquidity is defined, and various indicators used to assess liquidity are presented. Next, the evolution of liquidity in the GoC bond market is described and compared with that in Australia, France, Japan, New Zealand, the United Kingdom, and the United States. Third, several longer-term trends and cyclical factors that contributed to the decline and subsequent rebound in liquidity in the Canadian government bond market are examined. Finally, the article looks at the role of debt-management initiatives in supporting secondary market liquidity in the face of significant structural and cyclical changes.

Definition and Measurement of Liquidity

A market is generally considered to be liquid if it is possible to trade large amounts of securities in a minimum number of transactions with little impact on prices. Gravelle (1999a) characterizes liquidity according to four dimensions: i) *immediacy*, or the speed with which a transaction can be conducted; ii) *depth*, which refers to the maximum amount that can be traded at a given price; iii) *width*, or the bid-ask spread, which is the cost of accessing liquidity;[5] and iv) *resiliency*, which captures how fast prices revert to their equilibrium after a transaction. Given the many dimensions of market liquidity, it is difficult to summarize the concept in a single statistic. There are several ways to measure liquidity, although each has its shortcomings. Frequently used measures include the volume and frequency of trades, the turnover ratio,[6] the bid-ask spread, the mean transaction size, and the price impact of a trade (Fleming 2003; D'Souza and Gaa 2004).

Given the many dimensions of market liquidity, it is difficult to summarize the concept in a single statistic.

Of these different measures, two were considered for use in this article—the bid-ask spread and the turnover ratio. Theoretically, the bid-ask spread is considered to be a better measure than the turnover ratio as it captures more of the aforementioned dimensions of liquidity. However, data on bid-ask spreads are currently available only for a subset of the GoC bond market and are not readily available for all the countries under discussion.

Evidence in the literature suggests that markets in which bid-ask spreads are tight are also generally characterized by higher turnover ratios (BIS 1999a). The intensity with which securities trade, as measured by the turnover ratio, should be reflected in the bid-ask spread, since the inventory risk assumed by market-makers is a function of this intensity (Gravelle 1999b). Increased turnover is often associated with greater market depth and an improved ability to transact with minimal impact on prices, which in turn means lower inventory risk and thus smaller bid-ask spreads. Using a market-microstructure approach, D'Souza, Gaa, and Yang (2003) also find evidence that turnover in the GoC bond market is positively related to other liquidity measures, such as the bid-ask spread,

4. Gravelle discusses factors that contributed to the increase in liquidity over the early to mid-1990s.

5. The bid-ask spread is the difference between the highest price a buyer is willing to pay and the lowest price a seller is willing to accept for a given amount of a security in the secondary market. From a market-maker's perspective, the bid-ask spread is the compensation received for providing liquidity.

6. The turnover ratio is calculated by dividing the volume of securities traded over a given period of time by the average amount of securities outstanding over the same period. For purposes of comparison, the total value of securities outstanding is placed in the denominator, although using the value of the effective stock (the amount of securities that can be traded in the secondary market, which excludes securities held by passive investors) may be preferable in some instances.

although their findings are based only on data from the brokered interdealer market.

The turnover ratio will thus be used as the measure of liquidity throughout this article, given the suggestion in the foregoing discussion that an analysis of trends in either bid-ask spreads or turnover ratios should generate similar conclusions.

The Evolution of Liquidity in Various Government Bond Markets

Recent years have seen substantial variation in the turnover ratio in the secondary market for GoC bonds. After increasing during most of the 1990s, the turnover ratio fell considerably over the 1997 to 2000 period, only to subsequently recover. Similar patterns can be observed in some, but not all, other sovereign bond markets.[7]

From 1990 until 1997, there was a strong correlation between the amount of GoC bonds outstanding and the volume of transactions in the secondary market; both were rising rapidly, driven by federal government fiscal deficits (Chart 1). Between 1998 and 2000, the total nominal value of GoC bonds outstanding (including Real Return Bonds) stabilized at about $300 billion, while the annual volume of transactions of those securities declined. Consequently, the turnover ratio, which had been on an upward trend since 1990, fell back to its 1991 level. Trading volume has since rebounded, and the amount of GoC bonds outstanding has declined modestly, restoring the turnover ratio to levels last seen in 1998 (Chart 2).

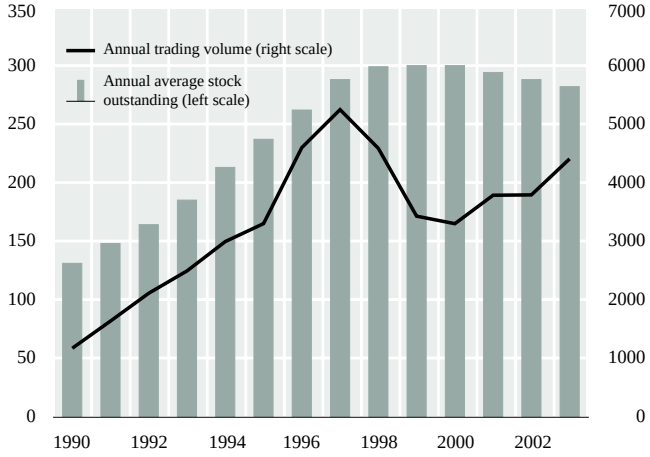
The decline in liquidity observed at the end of the 1990s was not confined to the GoC bond market. Australia and New Zealand, in particular, also saw their turnover ratios fall after peaking in 1997 and 1998, respectively. Contrary to the experience in Canada, however, trading activity in these markets has not rebounded since the early 2000s, and their turnover ratios have continued to decline.

In the U.K. and Japanese markets, turnover ratios trended downward for most of the 1990s, but only the former has seen a significant rebound since 2000. A

Chart 1

Government of Canada Bonds, Amounts Outstanding and Transacted

Government of Canada bonds ($ billions)



relatively resilient economy, as well as higher interest rates that made investing in the United Kingdom attractive relative to investing in other markets, are factors that may have supported this renewed activity in the U.K. market. In Japan, the general decline in liquidity coincided with a steady increase in government debt outstanding. This trend can be attributed to country-specific factors, such as the deterioration of Japan's public finances, which led to a downgrade of the government's credit ratings. This, in conjunction with very low nominal interest rates, reduced the attractiveness of Government of Japan securities to international investors, affecting the amounts transacted in this market and therefore the turnover ratio. However, the turnover ratio bottomed out in 1999–2000 and has increased somewhat over the past few years, possibly as a result of some improvement in the Japanese economic outlook.

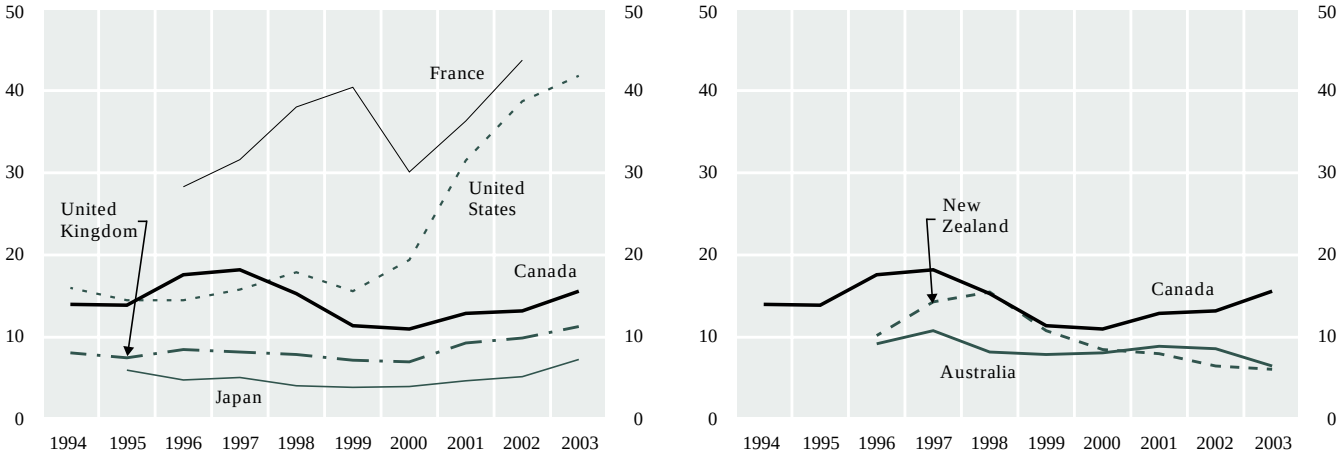
After steadily increasing over the second half of the 1990s, turnover in the French government bond market experienced a marked, though brief, decline in 2000. While liquidity in European fixed-income securities markets has benefited from the introduction of the euro, this event may have also contributed to the temporary drop in trading activity in the French market. With the euro, the risk related to fluctuations in exchange rates was eliminated, and yields began to

7. Since the data available to measure liquidity in different bond markets were obtained from a variety of sources, their comparability may be limited, owing to the use of different accounting methods across countries and different reporting periods (fiscal or calendar years).

Chart 2

Turnover Ratios in Various Government Bond Markets

Turnover ratios



converge across countries (Galati and Tsatsaronis 2001). A possible explanation for the drop in the turnover ratio in the French sovereign bond market, therefore, is that trading activity was temporarily diverted from the larger European markets as smaller European markets became more competitive.

In the U.S. Treasury market, the annual turnover ratio has risen virtually uninterrupted since the early 1990s. The size and maturity of this market have been factors in its global prominence, as evidenced by its role as a safe haven and by the historic status of the U.S. dollar as the world's reserve currency and the numeraire for many derivatives and commodities contracts.[8] These factors have helped to support the level of liquidity in the U.S. Treasury securities market, even in the face of developments that could have affected it in the opposite manner—notably the temporary but sharp decline in U.S. government borrowing over the 1998 to 2001 period. Since 1999, the U.S. turnover ratio has surged, which is partially attributable to high levels of hedging related to the extensive household and corporate refinancing made possible by declining and historically low interest rates.

From this international comparison, it is evident that turnover ratios can vary considerably from year to year and from country to country. It is possible, however, to identify common structural and cyclical factors affecting liquidity in most, if not all, sovereign bond markets. The remainder of this article examines several of these factors, as well as some factors that are specific to Canada, in an attempt to explain the evolution of the GoC turnover ratio over the past decade and the main drivers behind it.

Turnover ratios can vary considerably from year to year and from country to country. It is possible, however, to identify common structural and cyclical factors affecting liquidity in most, if not all, sovereign bond markets.

Trends Influencing Liquidity in the GoC Bond Market

Sovereign bond debt: Stock and volume issued

Government funding requirements vary over time as both policy and cyclical factors evolve; consequently,

8. Most derivatives and commodities contracts are quoted in U.S. dollars.

the stock of government debt is not a constant. This could have important implications for liquidity in sovereign bond markets if a relationship exists between the amount of government debt outstanding and liquidity. An important development in several sovereign bond markets in the late 1990s and early 2000s was a decline in the stock of government debt. Improvements in the fiscal situations of various central governments, attributable to a renewed commitment to fiscal responsibility and to an extended period of economic growth, considerably reduced their financing needs and debt issuance (Table 1).

A reduction in the size of a country's public debt brings many benefits. The most direct is the lowering of the government's costs of servicing debt as the stock of its interest-bearing debt diminishes.[9] These savings can also be amplified by a general decline in interest rates should the lower level of government indebtedness lead to a decline in the risk premium required by investors. Moreover, a decline in government issuance leads to a lessening of the crowding-out of corporate borrowing that usually accompanies periods of large public deficits, spreading the benefits of lower interest rates to other sectors of the economy.

Table 1

Gross Annual Issuance in Various Government Bond Markets

In billions of local currency, trillions for Japan

	Australia	Canada	France*	Japan	United Kingdom	United States
1992	12.9	39.0	n/a	20.9	31.2	451
1993	18.4	50.0	74.2	27.5	52.6	454
1994	18.6	59.3	82.6	27.9	30.6	453
1995	24.2	55.1	81.0	34.2	27.2	429
1996	11.8	67.2	87.6	36.0	37.7	519
1997	9.1	50.6	95.7	38.0	28.1	508
1998	5.7	56.2	101.6	63.1	11.0	418
1999	4.7	50.2	83.0	44.5	12.0	434
2000	3.8	45.8	89.0	58.8	6.4	331
2001	2.6	43.0	93.5	99.9	13.5	315

* Data for France are expressed in billions of euros for the years 1999–2001. Data for prior years are expressed in "synthetic" euros based on the conversion rate between the euro and the French franc. The term synthetic euros refers to the equivalent amount in euros had the common currency been used before 1999 instead of the national currencies.

Source: *OECD Central Government Debt: Statistical Yearbook* (2003)

9. In 2002–2003, the Government of Canada spent about 21 cents of each dollar of revenue on interest payments (Canada 2003). This is considerably less than the peak of 39 cents reached in 1990–91.

On the other hand, a reduction in the size of the public debt also represents an important challenge for debt managers concerned with the liquidity and efficient functioning of financial markets. Some authors, including McCauley and Remolona (2000) and Gravelle (1999a), have found links between the value of government debt outstanding and liquidity in the secondary market. Thus, decreased government borrowing has often been cited as a potential structural factor that contributed to the decline in liquidity seen at the end of the last decade in various markets.

After more than a quarter century of budgetary deficits in Canada, the Government of Canada has recorded surpluses each fiscal year since 1997–98 and has paid down $37.1 billion of market debt over the past six fiscal years (Canada 2003).[10] As well, the annual level of net bond issuance fell from a peak of $54.0 billion in fiscal year 1996–97 to $30.2 billion in fiscal year 2002–2003.[11] These developments coincided with a decline in transactions in the secondary market for GoC bonds and hence with a fall in the turnover ratio, although the impact has been moderated by initiatives undertaken by the government and by the Bank of Canada to support liquidity, as will be discussed further in the last section of this article.

Moreover, in 1996 the Bank of Canada adopted a policy that required the breakdown of its balance-sheet holdings to reflect the composition of the GoC's domestic-marketable debt.[12] Following this decision, the Bank gradually adjusted its holdings of GoC securities by increasing its purchases of government bonds relative to those of treasury bills. Between 1995 and 2003, the fraction of the total stock of GoC bonds held by the Bank increased from 2.5 per cent to 10.1 per cent, an increase of nearly $23 billion, further reducing the effective stock of tradable bonds (Bank of Canada, various years).[13] All else being equal, this lower effective stock of bonds reduces the turnover ratio, since the

10. The reduction in the government's debt was more pronounced in the market for treasury bills, the outstanding stock of which fell by nearly half between 1994 and 2000 following a government decision to increase the fixed portion of its debt to lower its refinancing risk.

11. The annual level of gross bond issuance has remained comparatively stable, falling from $54.0 billion in fiscal year 1996–97 to only $42.3 billion in 2002–2003. Differences between net and gross figures are the result of the repurchase of outstanding bond issues by the government.

12. Before this policy change, the Bank held more treasury bills than would have been dictated by the composition of the government's debt.

13. These figures are also affected by the size of the Bank's balance sheet, which grows as the amount of currency in circulation increases.

proportion of the total debt outstanding that is held by buy-and-hold investors, and thus not available for trading, is larger. The potential impact on liquidity of an increase in the Bank's holdings of GoC securities is mitigated, however, by the fact that these holdings can be borrowed by financial market participants should strong demand for a specific security lead to demand and supply imbalances in the secondary market.[14]

Decreased government borrowing likely played a role in the reduction in liquidity seen at the end of the last decade in Canada and other markets, but it was by no means the sole factor.

The decline in the stock of government debt and the curtailed borrowing programs were observed not only in Canada but also in Australia and, until recently, the United Kingdom and the United States. The contractions in government borrowing likely reduced trading activity in these secondary markets, at least temporarily. In contrast, France and Japan have seen steady increases in government borrowing over the period examined. For France, maintaining high levels of borrowing likely contributed to the general upward trend in liquidity illustrated by the rising turnover ratio. As discussed in the previous section, Japan's situation is different from that of the other countries examined. The upward influence exerted on the turnover ratio by an increasing supply of government debt was more than offset by country-specific factors that tended to reduce trading activity in the Japanese market.

Decreased government borrowing likely played a role in the reduction in liquidity seen at the end of the last decade in Canada and other markets, but it was by no means the sole factor.

Consolidation in the financial sector

The evolving structure of the Canadian financial services sector, including a wave of consolidations during the past decade, and particularly in the 1997 to 2000 period, may have also been a factor (Table 2). An increased number of mergers in the investment-fund and insurance sectors has led to larger institutional clients, and thus exposed market-makers to greater risk associated with providing liquidity. Larger participants on the buy-side mean an increased demand for the services of dealers able to bear the risk associated with large trades, giving larger dealers a comparative advantage.

As well, the number of government securities distributors in Canada fell from 48 at the beginning of 1993 to 23 as of July 2004, since some joined forces while others left the market.[15] This trend towards consolidation in the financial services industry has reduced the number of active participants and increased concentration in the secondary market. One indicator of the

Table 2

Mergers and Acquisitions in the Canadian Financial Services Industry

Number announced (average value, (Can$ millions)	Banks	Investment companies and funds	Insurance companies	Financial services, total*
1992	2	8	11	71
	(790.0)	(35.3)	(42.2)	(84.2)
1993	13	14	14	65
	(596.7)	(23.5)	(168.4)	(180.5)
1994	13	20	30	102
	(178.2)	(56.9)	(158.9)	(86.9)
1995	10	10	27	91
	(377.5)	(68.0)	(232.9)	(138.4)
1996	13	13	36	112
	(279.9)	(241.0)	(79.3)	(165.8)
1997	6	36	38	136
	(317.6)	(78.4)	(311.9)	(190.9)
1998	4	32	38	136
	(145.4)	(78.4)	(311.9)	(190.9)
1999	5	37	28	122
	(132.4)	(98.3)	(132.1)	(449.0)
2000	11	46	24	136
	(94.4)	(156)	(226.7)	(192.9)
2001	7	31	26	113
	(875.0)	(579.2)	(1012.3)	(448.2)
2002	6	21	13	79
	(181.9)	(164.1)	(1163.8)	(448.2)

* These categories are based on the Financial Services component of the S&P/TSX Composite Index. The rows do not total because the final column includes the subcategories listed as well as the Trust/Savings & Loan and Financial Management Companies, which are not represented here.

Source: Crosbie and Co., *Directory of Mergers and Acquisitions in Canada*

14. In 2002, the Bank introduced a securities-lending program, which will be discussed briefly in the last section of this article.

15. In 1998, the term "government securities distributor" replaced the previous designation, "primary distributor."

increased concentration in the Canadian securities industry is the greater combined market share held by the five and ten largest dealers in the secondary market for GoC bonds. These shares remained relatively stable until 1997, at between 52 and 60 per cent and between 80 and 90 per cent, respectively, but expanded gradually after 1998 to reach 68 per cent and 95 per cent in 2003 (Table 3). Although increased concentration is not necessarily detrimental to liquidity (see, for example, Dutta and Madhavan 1997), the potential reduction in competition among dealers could lead to increased trading costs and thus to a decrease in turnover. Consolidation could also lead to an increase in average transaction size, which would imply a greater price impact for the average trade. Thus, it is possible that consolidation played a role in the decline in liquidity observed in the GoC bond market in the late 1990s, although the recent rebound in liquidity would suggest that this role was limited, if present at all.

This being said, the full impact of the global trend towards increased consolidation may only become evident over time. The consolidation that has taken place in the brokerage and institutional investment industries worldwide may have led certain investors to favour larger, relatively more liquid markets. As the global financial industry consolidates, larger market participants conducting trades of greater value are emerging. For these participants, depth and liquidity are important market characteristics. This has the potential for a somewhat negative impact on the liquidity of smaller sovereign bond markets such as those of New Zealand, Australia, and, to a lesser extent, Canada.

Table 3

Aggregate Dealer Market Shares in the Secondary Market for GoC Bonds

Per cent

	Government Securities Distributors	
	Top 5	Top 10
1990	54.0	82.4
1991	56.7	83.6
1992	60.8	89.0
1993	57.1	90.0
1994	53.7	88.6
1995	53.4	84.0
1996	52.6	79.8
1997	51.7	84.2
1998	57.9	85.7
1999	60.5	90.2
2000	62.9	92.0
2001	66.9	94.6
2002	70.1	96.2
2003	67.8	95.3

Recourse to passive investing

Passive investment in fixed-income securities has grown over the years as individuals and institutional investors have begun to realize that the potential benefits of active management are sometimes more than offset by the extra costs associated with it.[16] For example, a study by Greenwich Associates estimates that the total amount invested in domestic bonds by large investment funds in Canada was $223.0 billion in 2002.[17] Of this amount, the study estimates that $68.0 billion (or 30.5 per cent) was managed passively, compared with $22.3 billion in 1998, or approximately 10.8 per cent of the $206.2 billion invested in domestic bonds during that year. When all asset classes are considered, the amount passively invested in domestic bonds, as a proportion of the total amount of assets under management, increased from 3.9 per cent in 1998 to 10.4 per cent in 2002, according to the same study. This structural shift towards passive investing reduces the number of active participants in the Canadian bond market and the effective amount of bonds available for trading, thereby contributing to a lower volume of activity and turnover ratio than would otherwise be the case.

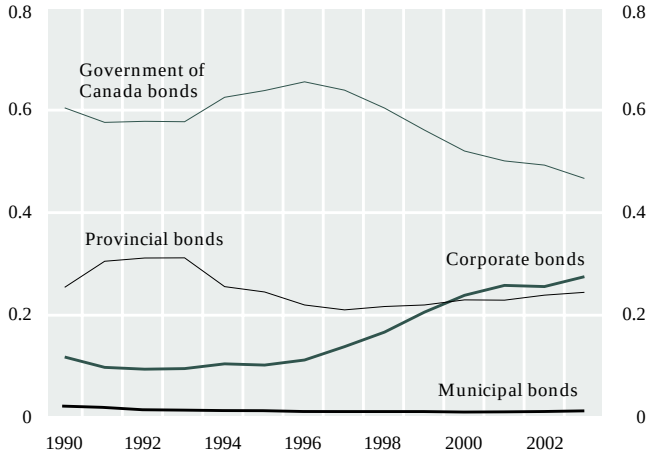
Liquidity in the GoC bond market has also likely been affected by the decline, which began in 1997, in the weighting of GoC bonds relative to corporate bonds in reference indexes (Chart 3). This is consistent with the decline in government borrowing compared to corporate borrowing in recent years. This change in the

16. Passive investors usually hold well-diversified portfolios (e.g., representing a market index), without attempting to find individual mispriced securities, and often hold fixed-income investments until maturity. Two common passive investment strategies are indexing and buy-and-hold.

17. This study is based on in-person and telephone interviews with officials from 269 funds between April and May 2003. The sample includes public and private sector pension funds, Canadian corporations, Canadian subsidiaries of U.S. corporations, endowments, and foundations with $100 million or more in assets under management. The funds interviewed are believed to represent approximately 70 per cent of the total number of funds in Canada with $100 million or more in assets under management. The numbers reported are projections to the Greenwich Associates universe of funds on results from sample interviews (Greenwich Associates 2003).

Chart 3

Year-End Composition of the Scotia Capital Universe Bond Index



Source: Scotia Capital

composition of indexes results in portfolios having relatively less exposure to GoC bonds and leads, by extension, to a decline in the volume of trades in the secondary market for these securities. The weighting of GoC securities in global fixed-income indexes has also declined in recent years, compounding the impact on liquidity in the GoC bond market.

Financial innovations

The last structural factors to be considered are related to the adoption of new financial instruments and technologies by participants in Canadian and international financial markets.

The first factor is a movement towards more sophisticated hedging strategies using instruments other than government securities. During the Asian and Russian financial crises of 1997 and 1998, correlations between prices of government securities and other assets changed dramatically. The usefulness of government bonds as hedging instruments was undermined at a time when effective hedges were particularly important. As a result, market participants have developed new hedging strategies to cover their exposures to yield-curve fluctuations and credit risk, reducing the demand for government securities for this particular purpose.

The second factor relates to the size and degree of development of the Canadian bond futures market. The relationship between a futures market and the secondary market for the underlying asset (the cash market) is not clear-cut. On one hand, a well-developed futures market helps to maintain liquidity in the cash market, since it can be used to hedge positions taken in that market. On the other hand, the cash and futures markets can be seen as substitutes, since they both reflect the same underlying interest rate risks and can thus be used interchangeably to speculate on those risks. While evidence exists of both substitution and complementarity effects between various futures and cash markets worldwide, Gravelle (1999a) finds volume measures for GoC bonds and futures to be positively correlated over time. On balance, active interest rate futures markets are generally perceived as having beneficial effects on liquidity in secondary markets for government securities. Therefore, the slower development of the Canadian bond futures market relative to that of other countries may have led to a slower increase in liquidity in the secondary market for GoC bonds than would otherwise have been the case.

While there are active futures contracts for the four main maturities of U.S. Treasury notes and bonds, there is currently only one liquid futures contract for government bonds traded in Canada, the 10-year GoC bond futures (CGB) contract traded on the Montréal Exchange.[18] Relative to both the amounts of government bonds outstanding and volumes traded in the secondary market, the level of activity in the Canadian government bond futures market is much less than that in the U.S. Treasury bond futures market (Table 4). While this is partly due to the prominence of the U.S. market and to the different numbers of actively traded contracts in each country, the relatively smaller size of the Canadian bond futures market is also evident when compared with other countries.

In major European, Japanese, and U.K. markets, the total amount of bond futures transacted generally represents several times the total outstanding stock of government bonds. In contrast, the value of GoC bond futures trading has fluctuated between 40 and 80 per cent of the stock of bonds outstanding since the mid-1990s. Liquidity in the Australian government bond futures market is also higher than liquidity in the GoC bond futures market. For example, the total volume of transactions in the Australian bond futures market

18. On 3 May 2004, the Montréal Exchange introduced a new 2-year GoC bond futures contract (the CGZ).

Table 4

Measures of Liquidity in Government Bond Futures Markets

	Market					
	Australia		Canada		United States	
	Futures turnover ratio*	Futures-to-cash ratio**	Futures turnover ratio*	Futures-to-cash ratio**	Futures turnover ratio*	Futures-to-cash ratio**
1993	n/a	n/a	0.48	0.04	3.68	0.25
1994	n/a	n/a	0.70	0.05	4.35	0.27
1995	n/a	n/a	0.46	0.03	3.55	0.25
1996	16.01	0.91	0.42	0.02	3.28	0.23
1997	17.21	0.94	0.46	0.03	3.76	0.24
1998	17.84	1.16	0.63	0.04	4.31	0.24
1999	19.30	1.69	0.54	0.05	3.64	0.23
2000	22.43	2.04	0.50	0.05	2.79	0.14
2001	30.77	2.39	0.62	0.05	2.90	0.09
2002	33.79	2.57	0.62	0.05	2.85	0.07
2003	42.08	2.70	0.79	0.05	2.95	0.07

* Annual number of futures contracts traded multiplied by the nominal value of each contract and divided by the average annual outstanding stock of government bonds

** Annual number of futures contracts traded multiplied by the nominal value of each contract and divided by the annual volume of government bonds traded in the secondary (cash) market

is roughly two and a half times that in the secondary market for Australian government bonds, whereas in Canada the comparable figure is around five per cent. The Australian bond futures market is a special case, however: supporting liquidity in this market is an explicit objective of the government's debt-management program, given the small size of the secondary market.

A third factor related to financial innovations concerns the slower adoption of electronic trading platforms in Canada compared with the United States and Europe. This could also have contributed to relatively lower liquidity in the GoC secondary market, since these platforms have the potential to facilitate the price-discovery mechanism, increase cost efficiency, and improve the liquidity and transparency of the market.[19] Thus, the recently established Canadian e-trading systems could have a beneficial effect on liquidity in the GoC bond market.[20]

19. Chouinard and Lalani (2001–2002) discuss the development of e-trading platforms in Canada.

20. Three institutional e-trading systems were launched in Canada in 2002: Bloomberg BondTrader, CANDEAL, and CollectiveBid's Institutional Marketplace.

Cyclical Factors Influencing Liquidity in the GoC Bond Market

In addition to the trends already noted, several cyclical factors have also influenced the evolution of liquidity in the secondary markets for GoC and other sovereign bonds. Furthermore, reversals in some of these cyclical factors in recent years have coincided with the rebound in liquidity in the GoC bond market.

Several cyclical factors have . . . influenced the evolution of liquidity in the secondary markets for GoC and other sovereign bonds.

Changes in investor risk appetite

Cyclical changes in investor risk appetite likely played a role in the decline in liquidity in some government debt markets in the late 1990s. The Asian and Russian financial crises of 1997 and 1998 led to increased risk aversion among investors, causing a widespread "flight to quality" as many market participants moved away from emerging markets and other riskier, less-liquid assets.[21] In particular, investors decreased their exposure to smaller government securities markets such as those in Australia, New Zealand, and, to a lesser extent, Canada. This increase in investor risk aversion also had an impact on the U.S. Treasury market, creating greater demand for larger, more liquid issues and leading to a temporary decline in liquidity for non-benchmark securities and wider spreads relative to benchmark bonds.

These financial crises also led to the substantial losses suffered by the Long Term Capital Management (LTCM) hedge fund and by other similar investors as the historical asset-price relationships on which their models were based broke down. Since these investors were highly leveraged and followed similar investment strategies, the actions they took to protect their capital added to the stress in financial markets as liquidity dried up and credit spreads widened. Lenders that had previously financed the activities of these

21. For an overview of the events of the autumn of 1998 and their impact on financial markets, see BIS (1999b).

hedge funds began to reassess the inherent risk-return trade-offs and subsequently tightened borrowing requirements. The substantial withdrawal of hedge-fund financing that ensued, combined with investors' own reassessments of risk, resulted in a reduced presence in the market and may have contributed to the decline in GoC bond market turnover in the late 1990s.

Anecdotal evidence suggests that hedge-fund activity has resumed in recent years, both in the Canadian bond market and globally. More generally, investor risk appetite has returned and is currently at high levels, as evidenced by the narrow spreads for corporate and emerging-market bonds.

Interest rate environment

The decline in liquidity observed over the 1997 to 2000 period may also be partially attributed to cyclical factors in the interest rate market. The period of diminishing liquidity was characterized by extremely flat, and occasionally inverted, yield curves. This tends to suppress speculative activity, since trading opportunities across maturity sectors become scarce. A second characteristic of the period, which likely contributed to a reduction in international demand for Canadian government securities, was that Canadian yields were generally equal to or below comparable yields on U.S. Treasury securities. Anecdotal evidence suggests that the level of activity of international investors in the Canadian market tends to be influenced by the level of interest rates in Canada compared with those in the United States.

The interest rate environment has changed substantially over the past four years. Starting in 2000, substantial easing by North American central banks led to extremely steep yield curves in both Canada and the United States, and the relatively more accommodative policy stance of the U.S. Federal Reserve contributed to wider Canada-U.S. spreads across the maturity spectrum. As well, with interest rates near all-time lows, hedging activity related to mortgage and corporate refinancing increased significantly, especially in the U.S. market.

Equity-market environment

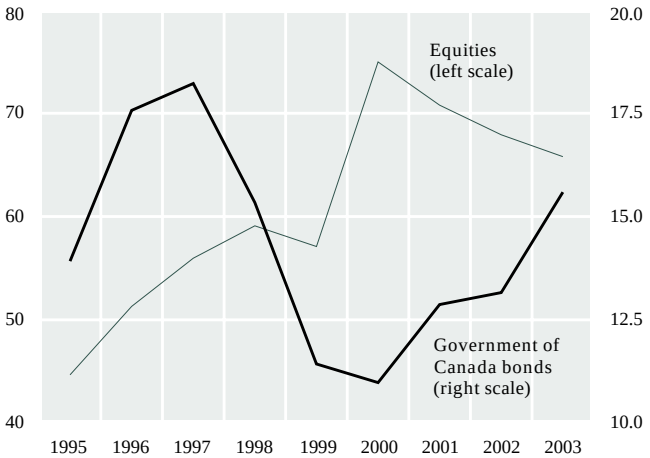
While researchers have begun to explore the links between liquidity in bond and stock markets, much work remains to be done in this area.[22] To the extent that stocks and bonds are substitute assets, it is reasonable to expect that volumes traded, and thus turnover ratios, in the respective markets might be negatively correlated. In particular, cyclical factors might lead trading activity to focus more on one asset class than another at different times.

Given that the period under examination includes the equity bubble of the late 1990s, it is quite reasonable to expect that one factor behind the decrease in the turnover ratio in government bond markets was investors' heightened focus on equity markets. Indeed, the turnover ratio in the GoC bond market reached a low of 11 in 2000, corresponding to the peaks in equity-market valuations and turnover in the Canadian equity market.[23] The sharp decline in equity prices that began in early 2000 after the bursting of the tech bubble coincided with the beginning of the rebound in the bond market turnover ratio, as well as a decrease in the turnover ratio of the Toronto Stock Exchange (TSX) (Chart 4). Turnover ratios in other government bond markets also reached low points around the same time.

Other indications of the market's increased relative focus on equity markets in the late 1990s and in the year

Chart 4

Turnover Ratios for the Toronto Stock Exchange and the GoC Bond Market



Source: Bank of Canada and World Federation of Exchanges

22. For example, using high-frequency data, Chordia, Sarkar, and Subrahmanyam (2003) find factors that affect liquidity in both markets.

23. The annual value of shares traded on the Toronto Stock Exchange peaked in 2000 at $944 billion, representing a 78.5 per cent increase from 1999. In 2001, the value of shares traded declined by 24.5 per cent, to $713 billion. Over the 1993 to 2003 period, the annual average value traded was $475 billion (TSX 2003).

2000 are the revenue breakdown for firms in the Canadian securities industry and the composition of net new mutual fund sales at that time. For the securities industry as a whole, revenue from fixed-income trading activities generated only 5 per cent of total revenue in 2000, at the peak of the equity bubble, compared with 23 per cent in 1991 (IDA 2001). In addition, the Canadian mutual fund industry experienced net redemptions of bond and income funds for the 17 consecutive months between August 1999 and December 2000.[24]

Policy Initiatives to Foster Liquidity

Since 2000, liquidity in the Canadian and other sovereign bond markets has recovered despite the continued opposing influence of some of the aforementioned factors. Gross bond issuance by the Canadian government has remained relatively steady, while net issuance and the total amount of bonds outstanding have continued to decline modestly. Consolidation in the financial services sector has continued, and passive investment strategies remain popular.

Reversals in some cyclical factors likely played a role in the recent recovery in liquidity seen in the secondary market for GoC bonds. But perhaps this recovery is also a reflection of the success of a series of policy initiatives undertaken over the years by the government and by the Bank of Canada, as the government's fiscal agent, to support a liquid and well-functioning market for GoC securities. Harvey (1999) discusses some of the early initiatives, including changes made to the rules governing the primary issuance of GoC securities, to the surveillance of the auction process, and to the treasury bill and bond programs, as well as the introduction by the Investment Dealers Association of a set of guidelines and standards for transactions in the domestic secondary fixed-income market (IDA Policy No. 5). Efforts to further enhance the efficient functioning of the primary and secondary markets for GoC securities have continued in recent years. The government and the Bank of Canada consult regularly with market participants, who are generally positive about the initiatives undertaken to date.

Perhaps this recovery is also a reflection of the success of a series of policy initiatives undertaken over the years by the government and by the Bank of Canada . . . to support a liquid and well-functioning market for GoC securities.

A bond-buyback program was created through which the government repurchases older outstanding securities. This program helps to maintain gross bond issuance at relatively stable levels despite lower financing needs. Other recent initiatives include reductions in the turnaround time for the release of auction and buyback results, a broadening of the basket of bonds eligible for repurchase by the government, and the introduction of a switch-buyback program as an ongoing debt-management tool. The government's commitment to a regular, transparent issuance program and to relatively predictable issuance and maturity patterns is also supportive of liquidity. While those initiatives are mostly directed towards the primary market, they benefit secondary-market liquidity as well by contributing to the maintenance of large, liquid benchmark bond issues in specific maturity sectors.[25] Furthermore, in 2002 the Bank of Canada introduced a securities-lending program, which allows the Bank to make available a portion of its portfolio of GoC bonds and treasury bills when there is strong demand for these securities. While no operations have yet been required, the program would support market liquidity by alleviating short-term demand and supply imbalances in the secondary market.

Other jurisdictions around the world have also been actively looking for ways to improve their issuance programs and to enhance liquidity in the markets for their securities. European issuers of government debt in particular have been proactive on that front in recent years, since they must increasingly compete with each other. Some countries have concentrated

24. Data for these calculations were supplied by the Investment Funds Institute of Canada.

25. The current target sizes for benchmark bond issues with maturities of 2, 5, 10, and 30 years are $7 billion to $10 billion, $9 billion to $12 billion, $10 billion to $14 billion, and $12 billion to $15 billion, respectively.

their bond issuance in a few specific maturities to build larger and more liquid bond issues. Many have endeavoured to adopt a more transparent and regular borrowing program. Some have also introduced bond repurchase or exchange programs to recycle some of their existing bond debt into more liquid issues.

Conclusion

Market liquidity is a complex and multifaceted concept that is difficult to capture using any single measure. Numerous cyclical, structural, and policy-related factors can have an impact on a market's liquidity; therefore, any tendency to place too much emphasis on a single contributing factor should be avoided.

Turnover ratios have been used in this article, owing to the cross-country nature of the analysis, which limits the ability to use other, more sophisticated measures. Although turnover ratios vary substantially from country to country as well as over time, our analysis suggests that liquidity in the market for GoC bonds is healthy and that its evolution has generally been in line with that of other markets. After increasing steadily over most of the 1990s, the turnover ratio in the GoC bond market declined between 1997 and 2000, but has since rebounded.

Recent variations in liquidity in the market for GoC bonds seem to be largely a result of cyclical factors, including changes in the level of investor risk appetite, changes in the interest rate environment induced by significant easing of monetary policy among central banks, and developments in equity markets in the late 1990s.

From a longer-term perspective, factors such as the structure and level of government debt, developments in the financial services industry, and the introduction and rate of adoption of new trading technologies and financial instruments also play important roles in shaping liquidity in government bond markets. In addition, governments around the world, including Canada, have taken measures to foster liquidity in their respective securities markets.

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Canada's Capital Markets: How Do They Measure Up?

Sheryl Kennedy, Deputy Governor

This is a revised version of a speech given in May 2004 as part of the Women in Capital Markets luncheon speakers' program. Several tables and charts have been added for purposes of illustration.*

As Canada's central bank, we take a keen interest in promoting a safe, sound, and efficient financial system. Today, I'd like to discuss a key component of Canada's financial system, our capital markets, and how these measure up in a global context.

The Bank of Canada has been following and, in some instances, helping to develop financial markets for over fifty years. During that time, capital markets have evolved and grown considerably. In this talk, I'd like to focus on how Canada's capital markets compare in terms of some of the factors that contribute to market efficiency and, where possible, compare Canadian capital markets with those in other countries.[1]

Efficient Markets and the Allocation of Capital and Risks

Markets play a key role in allocating capital and distributing risk: to do so effectively, they must be based on a safe and sound legal framework and financial infrastructure. The importance of integrity in the marketplace cannot be overstated, since, for markets to work efficiently, participants must be able to place their trust and confidence in them.

Efficiency actually consists of three different, yet interrelated, aspects: efficiency in allocating capital and risks, efficiency in market operations, and efficiency in transmitting information. In economic terms, overall allocational efficiency means that funds are channeled to the most profitable projects and that risks are borne by those who can best afford to bear them. Operational efficiency means that market participants are able to conduct transactions at competitive cost, and informational efficiency means that all available information is incorporated into prices. The amount of informational and operational efficiency determines the degree to which markets are allocationally efficient. So, misleading information or transactions costs that are too high can be an impediment to allocational efficiency and economic growth.

Participants must be able to place their trust and confidence in capital markets for these markets to work efficiently.

As noted above, the first of the three aspects, allocational efficiency, means that investors provide funds to the projects that are most likely to be profitable—i.e., that firms are able to finance investment projects which have a positive net present value. In practical terms, this means capital markets must have the capacity to finance projects that cover the whole

* For more details on this program, visit their Web site at http://www.wcm.ca.

1. For a survey of recent research in this area, see "The Efficiency of Canadian Capital Markets: Some Bank of Canada Research" by Scott Hendry and Michael King (this *Review*).

spectrum of economic activity, over both short and long time frames, and involving different levels of risk. Considered in these terms, do Canadian firms have access to complete and vibrant markets? And are these markets able to handle the full range of risk?

Market completeness and access

A complete market[2] can be thought of as one that has a full array of financing options at its disposal to allow participants to cover all possible contingencies. In a small, open economy such as ours, completeness is a global notion, and discussion revolves around the capacity not only of domestic, but also of international, markets to fulfill these roles. In either case, the key question is whether firms have access to the capital they need, in markets where a full range of instruments is available to hedge, or distribute, risk.

The size of a market is important because large-market countries like the United States are better able to take advantage of economies of scope and scale. Although size in itself does not make a market more efficient, it can contribute to efficiency by increasing the potential for liquidity of a market and the diversity of its products. Clearly, Canadian markets are much smaller than those in the United States, Europe, and Japan, but they compare well with those of other countries with similarly sized economies.

Take the fixed-income market as an example. The U.S. fixed-income market is extremely well developed and much larger than all other fixed-income markets. In fact, the U.S. market is 32 times the size of Canada's market, 15 times the size of the U.K. fixed-income market, and 3 times that of Japan (Table 1).

Fixed-income markets include both public sector and corporate debt. In terms of corporate bonds, the U.S. market is, again, by far the largest, with about half of the world market. The euro zone has about 30 per cent of the world market, and Japan has about 6 per cent. Canada and the United Kingdom each represent approximately 1 per cent of the world corporate bond market (Chart 1).

Of particular note, however, is that Canada's corporate bond market has expanded considerably over the past decade and now stands at about 23 per cent of the Canadian-dollar fixed-income market, up from 11 per cent in 1994. This reflects not only the progress made in reducing public sector debt over this period, but also increased use of Canadian fixed-income markets by corporate issuers and investors.

Turning to equity markets, when taking the Toronto Stock Exchange (TSX) and the TSX Venture Exchange together, Canada ranks seventh in market capitalization, just behind the major European players (Table 2). But in terms of the number of listed public companies, Canada ranks second in the world after the United States (Table 3). This divergence in rankings according

2. In economic terms, a complete market is one in which the full range of possible gambles on future states of the world can be constructed with existing assets.

Table 1

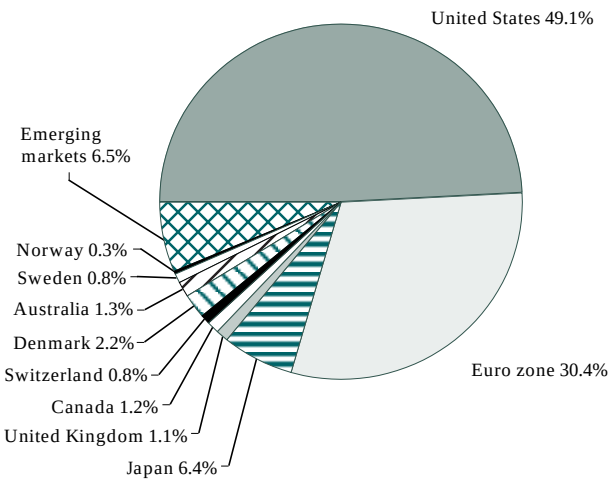
Total Bonds Outstanding (2003)

Country	US$ (billions)*	Per cent of market
United States	$21,351.4	47.6
Euro zone	10,306.2	23.0
Japan	7,164.2	16.0
United Kingdom	1,462.0	3.3
Canada	676.8	1.5
Denmark	390.1	0.9
Switzerland	388.7	0.9
Australia	342.3	0.8
Sweden	218.3	0.5
Norway	88.9	0.2
New Zealand	30.5	0.1
Emerging markets	2,425.2	5.4
TOTAL	$44,844.6	100.0

* Values for total bonds outstanding represent the sum of government, corporate, eurobond, and foreign bonds outstanding for each country.
Source: Merrill Lynch (2004)

Chart 1

Total Corporate Bonds Outstanding as a Percentage of the World Corporate Bond Market (2003)



Source: Merrill Lynch (2004)

to market capitalization and the number of listed companies reflects the fact that relatively more small firms are accessing public equity markets here in Canada than in other countries. Nor is financing limited to traditional instruments. Income trusts are another source of market financing that has developed in Canada for firms with a ready cash flow.

Canadian investors and firms also have access to derivative products to manage risks. A wide array of derivative instruments is available over-the-counter (OTC), including options, interest rate swaps, forwards, and foreign exchange derivatives. Credit-risk transfer products, however, are less developed. The liquidity and breadth of standardized derivative products available through Canadian exchanges has improved, but is still limited. Beside the short-term bankers' acceptance futures contract, only one liquid government bond futures contract is currently trading on the Montréal Exchange, although a second was recently introduced, the two-year Government of Canada bond futures (CGZ). In comparison, there are active futures contracts for the four main terms of U.S. Treasury notes, three bond futures in the euro zone, and one in the United Kingdom (Bloomberg 2004). So risk transfer in Canada relies more heavily on over-the-counter products (Table 4).

Table 2

Top 10 Stock Exchanges, by Market Capitalization

Exchange	Market capitalization (US$ millions)
NYSE	11,328,953
Tokyo	2,953,098
NASDAQ	2,844,193
London	2,460,064
Euronext	2,076,410
Deutsche Börse	1,079,026
TSX Group	888,678*
Swiss Exchange	727,103
Hong Kong	714,597
Borsa Italiana	614,842

* Equivalent to Can$1,215 billion
Source: World Federation of Exchanges (2003)

Table 3

Number of Listed Companies, by Region

	Total	Domestic	Foreign
United States	6,159	5,295	864
Canada	3,616	3,578	38
Japan	3,346	3,314	32
United Kingdom	2,692	2,311	381
Australia	1,471	1,405	66
Euro zone	6,428	5,825	603

Source: World Federation of Exchanges (2003)

Table 4

The Global Market for OTC Interest Rate Derivatives

Gross market values

Amounts outstanding at year-end 2003 (US$ billions)	
	141,991
With reporting dealers	63,579
With other financial institutions	57,564
With non-financial customers	20,847
Euro	55,793
U.S. dollar	46,178
Japanese yen	19,526
Pound sterling	9,884
Swiss franc	2,444
Swedish krona	1,520
Canadian dollar	1,302
Other	5,344
Exchange-traded contracts	33,917

Source: BIS (2004)

Access to Global Markets

From the perspective of Canadian firms, financing options are not limited to what is offered in Canada alone. Data show that larger Canadian firms have developed the size and reputation to access global markets on a cost-effective basis. In terms of dollar value, Canadian corporations raise about half of their bond issues offshore, most recently mainly in the United States. These U.S. offerings are twice the size of Canadian offerings, on average. Large investment-grade Canadian firms have a range of low-cost financing options in Canada but, when raising large amounts of capital, they often decide to look abroad as well. And, because the United States has the world's largest high-yield market, Canadian firms with large high-yield financing needs tend to go there (Anderson, Parker, and Spence 2003).

But challenges remain for smaller, non-investment-grade Canadian companies. Canadian markets for these issues are limited, and firms need to have relatively large deals to tap into the U.S. market. So how do these firms get financing? Largely, it would appear, through bank loans or private equity (Table 5).

Canadian firms have long taken advantage of opportunities in international equity markets. In 2003, over 180 Canadian firms were listed on a U.S., as well as a Canadian, exchange—the largest number of listings of any foreign country on a U.S. exchange (TSX 2003). In recent years, Canadian interlisted stocks have represented roughly 15 per cent of listings, up from 10 per cent in the 1980s (Chouinard and D'Souza 2003-2004) (Chart 2).

Table 5

Top 10 Countries Based on Private Equity Investment, 2002

Country ranking	Investment value (US$ billions)	Funds raised (US$ billions)
United States	62.68	54.89
United Kingdom	9.58	13.42
France	5.53	4.54
Italy	2.48	1.89
Japan	2.38	0.72
Germany	2.37	1.55
South Korea	1.95	0.36
Netherlands	1.63	1.13
Canada	1.57	2.07
Sweden	1.39	0.61

Note: Figures shown above are annual rather than cumulative values for 2002. The amount invested may be lower than the amount raised, as there may not be enough attractive investments in a given year to warrant using the funds raised. On the other hand, some firms may find an abundance of attractive investments in a given year and may invest more funds than have been raised. This is often possible because funds raised in previous years have yet to be invested.

Source: PricewaterhouseCoopers and 3i (2003)

Liquidity and Transactions Costs

What about the efficiency of market operations themselves? Are participants able to conduct transactions at a competitive cost? Key characteristics for consideration here include liquidity and transactions costs.

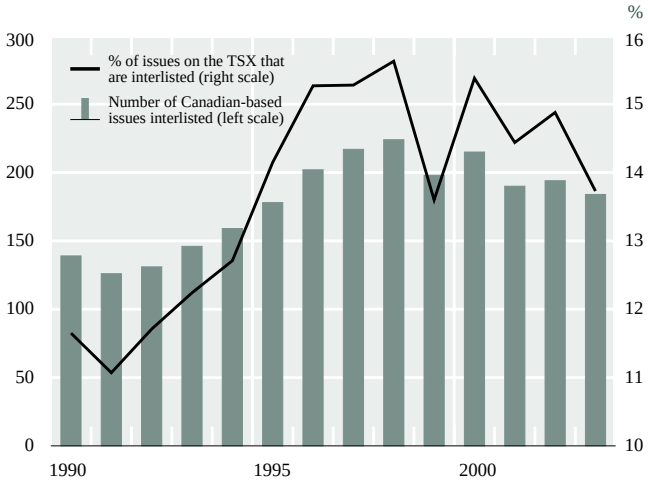
Liquidity

A liquid market is one in which large amounts of securities can be traded in a minimum number of transactions and with little impact on prices. As a market becomes more liquid, it encourages more trading, which, in turn, attracts more market participants, resulting in a virtuous circle where markets become more liquid and more efficient over time.

There are several measures of liquidity. Analysis at the Bank of Canada (Anderson and Lavoie 2004) of one proximate measure—turnover ratios in the sovereign bond market—shows that Canadian government bond markets are doing quite well in terms of liquidity, evolving in line with those of other countries (Chart 3). Corporate fixed-income markets are less liquid in Canada, although secondary trading has

Chart 2

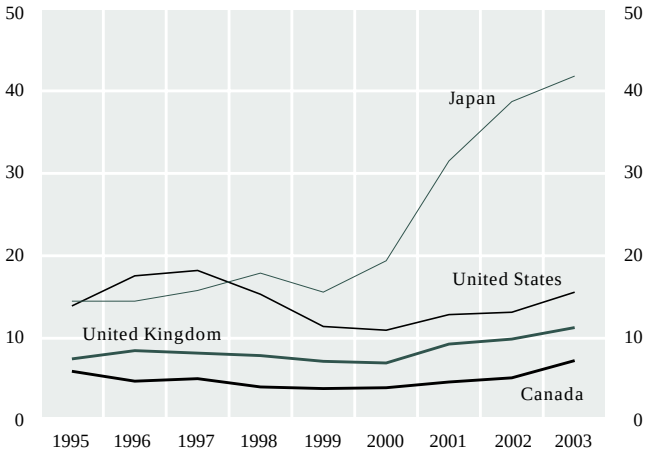
Canadian-Based Issues Interlisted on at Least One U.S. Exchange



Source: *Toronto Stock Exchange Review* (2003)

Chart 3

Turnover Ratios in the Sovereign Bond Market



Sources: Bank of Canada, Federal Reserve, Japan Ministry of Finance, Bond Market Association, LSE, UK Debt Management Office

increased since the latter half of the 1990s (Bank of Canada, various years).

The liquidity of Canadian equity markets tends to be lower than that of the major global exchanges. However, liquidity on the TSX has been on an upward trend for some time, with the volume of shares traded increasing by about 3.5 times since the mid-1990s and the value of shares traded having tripled over the same period.[3]

Transactions costs

Transactions costs provide another indication of liquidity. It is generally agreed that high liquidity usually means lower transactions costs. According to one study, bid-ask spreads in Canadian fixed-income markets are among the narrowest in the world, after the United States and the United Kingdom (Table 6).

As for equities, research suggests that the costs of an Initial Public Offering (IPO) on the TSX are competitive or better than in the United States (Hail and Leuz 2003). Competition with foreign stock exchanges, as well as cross-listing, has probably contributed to the narrowing of bid-ask spreads and other trading costs.

New technology can play an important role when it comes to lowering transactions costs further. Electronic trading systems can support more efficient operations and information sharing, leading to faster trading, increased competition, and, as a result, lower transactions costs. Technological innovation can also enable enhanced transparency, further improving operational efficiency. Alternative trading systems have been slower to evolve in Canada than in the United States and Europe, so this is an area where there is room for Canadian capital markets to develop further.

Straight-through processing (STP)[4] can provide further efficiency gains. If done properly, STP may also help reduce risks inherent in the clearing and settlement of financial market transactions. In this regard, I find it encouraging that the Canadian Capital Markets Association (CCMA) is taking the lead in promoting STP in Canadian financial markets. It is crucial that Canadian market practices keep pace here to increase operational efficiency and remain competitive with other markets, such as those in the United States, which are also moving in this direction.[5]

Table 6

Bid-Ask Spread for On-the-Run Issues

	Canada	Italy	Japan	United Kingdom	United States
Fixed coupon					
2 years	2	3	5	3	1.6
5 years	5	5	9[2]	4	1.6
10 years	5	6	7	4	3.1
30 years	10	4	16[3]	8	3.1
Index-linked					
10 years	25	n/e[1]	n/e[1]	15	6.3

	Belgium	France	Germany	Sweden	Switzerland
Fixed coupon					
2 years	n/a	4	4	4	n/e[1]
5 years	n/a	5	4	9	n/e[1]
10 years	5	10	4	15	10
30 years	n/a	24	10	27[4]	25
Index-linked					
10 years	n/e[1]	n/e[1]	n/e[1]	39	n/e[1]

Note: The spreads, given in one-hundredths of a currency unit for the face amount of 100 currency units, apply to interdealer transactions.
1. Does not exist
2. For 6-year bonds
3. For 20-year bonds
4. For 22-year bonds
Source: BIS (1999)

Transparency and Market Integrity

Having a broad range of markets that can be accessed at low cost is one thing, but a third aspect of efficiency, informational efficiency, must also be considered. Informational efficiency refers to the extent to which all participants have timely and equitable access to relevant information and the extent to which this information is fully reflected in market prices. Transparency and market integrity are key attributes supporting informational efficiency.

Transparency

Market transparency refers to the amount of quote, price, and volume information available to markets and the general public. The optimal level of transparency will vary, depending on the structure of the market; however, in general, enhanced transparency can be of

3. One measure of liquidity in equity markets is turnover velocity (ratio of the value of shares traded to market capitalization), which is measured at 66 per cent for the TSX; 281 per cent for the NASDAQ; 148 per cent for Deutsche Börse Group; approximately 100 per cent for New York, London, and Euronext; and 80 per cent for Australia. Turnover velocity on the TSX was 44 per cent a decade ago (World Federation of Exchanges 2003).

4. The Canadian Capital Markets Association defines industry-wide STP as "seamlessly passing information electronically on a timely, accurate, system-to-system basis to all parties in the end-to-end securities transaction chain without manual handling or redundant processing" (CCMA 2004).

5. Refer to the CCMA Web site for details: www.ccma-acmc.ca.

benefit in helping a market to work more efficiently. This is particularly important for retail investors, who typically do not have the same quality and variety of resources to acquire information as large institutional investors (Zorn 2004).

Transparency and market integrity are key attributes supporting informational efficiency.

In Canada, equity markets are generally fairly transparent, while fixed-income markets are less so. This reflects the fact that equities are traded mainly on centralized exchanges, where the terms of trade are widely available, whereas fixed-income markets have generally been structured as decentralized dealer markets. In fixed-income markets, dealers provide a quote to each potential counterparty. They also act as market-makers, taking on inventory risk. Complete transparency in these circumstances may reduce their ability to manage this risk, which could have the perverse effect of reducing liquidity and increasing transactions costs. On the other hand, measured steps to increase transparency in fixed-income markets, in line with developments globally, are an important element in improving market efficiency.

Note, too, that, if we want to encourage an active secondary market for loans here in Canada, we also need to enhance transparency with regard to lending activity. Standardizing loan documentation and making terms and pricing information more accessible to borrowers and investors would help in this regard. Such transparency could help to expand these markets, thus improving liquidity, efficiency, and risk management.

Market integrity

Integrity is the cornerstone of market efficiency. Markets tarnished by fraud, insider trading, and manipulation cannot attract a large investor base. Without broad participation, liquidity decreases, there is even less incentive to participate, and a vicious circle develops where markets become less liquid, and as a consequence, less efficient, over time.

There are many ways to foster market integrity. Three that are particularly relevant to this discussion are disclosure, to enable equal and timely access to all relevant information; efficient regulation and codes of conduct, to establish the rules of the game in a cost-effective manner; and vigorous enforcement, to punish wrongdoers and to encourage all parties to comply with the rules.

i) Disclosure

As a result of corporate accounting and governance scandals, much is being done to improve the disclosure of timely and accurate financial information. This should also involve making corporate reporting more understandable to everyone and more forthcoming about the assumptions and risks underlying projections of future outcomes (Kennedy 2003). Many players are actively involved in improving disclosure. The Canadian Securities Administrators have developed rules about continuous disclosure by publicly traded companies, and now require company CEOs and CFOs to certify financial statements[6] to help prevent the circulation of misleading information to investors (CSA 2004).

The Canadian Institute of Chartered Accountants (CICA) is addressing issues raised by accounting scandals, and the Canadian Public Accountability Board has been jointly established by the CICA, the CSA, and the Office of the Superintendent of Financial Institutions (OSFI) to oversee the activities of auditors of public companies. In addition, Industry Canada has just released a discussion paper that outlines proposals to amend the Canada Business Corporations Act (CBCA) to enhance the transparency and accountability of corporations (Canada 2004). Credit-rating agencies are also taking a closer look at corporate governance issues and the quality of financial statements when issuing ratings.

ii) Regulation and codes of conduct

A second key factor to support market integrity is the quality of regulations and the implementation of professional codes of conduct. Supporting regulations and codes of conduct is not the same thing as advocating the writing of endless rules. There is a trade-off between regulation and market efficiency, as too many rules will eventually hamper the efficient functioning of markets and can stifle innovation. Merely establishing rules each time there is a problem won't necessarily solve the problem. In fact, it may create new ones. That is why market participants also have to

6. The certification of disclosure rule has not been adopted by the British Columbia Securities Commission.

take the initiative to develop codes of conduct and abide by agreed-upon standards of market practice. The incentive to do so is there because good practices make for good business. Integrity has a market value for financial intermediaries.

Setting out guidelines for professional behaviour, codes of conduct, and agreed-upon market best practices allows everyone to know and play by the same rules. The idea is to reduce conflicts, align incentives, and clearly define appropriate practices in order to minimize the costs that arise both from excessive regulation and from corporate misconduct.

On balance, financial market regulation needs to be designed so as to enhance the efficiency and competitiveness of our markets.

Canada's regulatory regime and codes of conduct must tackle head-on the risks of conflicts, market manipulation, insider trading, and fraud. But, at the same time, policy-makers have to be sensitive when drawing up rules in order not to impose unnecessary costs. On balance, financial market regulation needs to be designed so as to enhance the efficiency and competitiveness of our markets.

iii) Compliance and enforcement

Of course, as good as regulation and codes of conduct may be, they will not promote market efficiency without strong compliance procedures and effective enforcement. As we all know, markets that are seen to be fair work better and attract more participation and more liquidity.

Over the past year, governments, law-enforcement agencies, and securities commissions have all taken action to beef up our enforcement capabilities here in Canada. Because, frankly, this is one area where there is concern about our track record. But results will have to be demonstrated, so it will take time—it is to be hoped, not too much time—to turn around our track record in this regard.

And let's not forget that integrity starts with the individual. It is essential that market participants be vigilant in ensuring that everyone is following the spirit, as well as the letter, of the rules and codes of conduct that have been put in place.

Conclusion

Overall, Canadian capital markets are efficient in many respects and measure up well when compared with those of other countries of comparable size. However, there are areas requiring improvement, and the competition never rests. To hold our own against the very deep, very liquid U.S. capital markets, we have to continue to try harder. This means working to develop and enhance access to new markets, instruments, and pools of capital. And more work will be needed to reduce transactions costs, become more transparent, and strive for cost-effective regulation and world-class codes of conduct. What is particularly important in the current environment is to strengthen our compliance and enforcement efforts in order to bolster trust and confidence in the integrity of our markets. In this way, the Canadian capital markets that have worked so well to date will continue to grow and evolve to best serve the interests of borrowers and investors in the twenty-first century.

Canadian capital markets are efficient in many respects and measure up well. . . . However, there are areas requiring improvement, and the competition never rests.

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The Canadian Experience with Counterfeiting

*John F. Chant**

- *Because of the important role that paper money plays in Canada's payments system, counterfeiting is a significant public policy issue. Both the public and the central bank have a stake in preventing counterfeiting.*
- *Changing technology in the form of photocopiers and computer printers has led to a marked increase in the threat of counterfeiting in all economies since the early 1990s.*
- *An appropriate policy response to this crime is necessary to maintain the public's continued confidence in the national currency.*
- *Estimating the stock of counterfeits circulating is necessary to assess the threat from counterfeiting, including the possible loss of confidence in a currency. A composite method is proposed as an effective alternative to existing methods.*
- *Indications are that there was one counterfeit note in circulation for every 290 Canadians in 2001 and that the value of outstanding counterfeits was less than 19 cents per person.*
- *The incidence of counterfeiting has nearly doubled since 2001. The Bank of Canada is continuing to introduce a new series of bank notes with more advanced security features to discourage counterfeiting.*

Counterfeiting has recently been in the spotlight of public and media attention, even though it is not the most lurid of crimes. Still, there is much uncertainty about the level of counterfeiting, leading to rumour and speculation among the public. *The Economist* (2001) cites one forensic analyst who claims that as much as 2 to 3 per cent of the former eurocurrencies and 30 per cent of U.S. dollars circulating in Russia, Eastern Europe, Africa, and elsewhere may be counterfeit. These levels for U.S. dollars contrast markedly with reports by the U.S. Secret Service that only $47 million counterfeit notes were detected in the United States during 2001.[1]

The recent attention raises a number of issues. Does the heightened interest reflect changes in the significance of counterfeiting? What cost does counterfeiting impose on Canadians? How significant are counterfeits relative to overall currency? What policy challenges does counterfeiting pose? This article addresses these issues with specific reference to the counterfeiting experience in Canada for 2001.[2]

Counterfeiting is a significant public policy issue because, despite rumours of its demise, paper money still remains an important part of our payments system. Approximately $36 billion in currency was in the hands of the public during 2001. Over 50 per cent of the notes consisted of $20 bills, with the remainder spread fairly evenly among the other denominations. Canadian individuals and businesses (including financial institutions) held, on average over 2001, almost 1.1 billion notes, or approximately 35 notes per person, an amount equal to more than $1,200 per capita, with 40 per cent of the value consisting of $100 notes.

* John Chant was Special Adviser at the Bank from September 2001 to August 2002. The views expressed in this article are those of the author. No responsibility for them should be attributed to the Bank of Canada. Issues related to counterfeiting are discussed more fully in Chant (2004).

1. See also Judson and Porter (2003), who deal directly with the circulation of counterfeits outside the United States.

2. Estimates of circulating counterfeits for the years 1993 to 2003 are provided in the Addendum to this article.

Counterfeiting is a significant public policy issue because, despite rumours of its demise, paper money still remains an important part of our payments system.

A number of parties have stakes in the prevention of counterfeiting. The public, especially those handling many currency payments, want to know the chances they face of receiving a bogus bill in any transaction. Central banks, which issue currency, want to know the degree to which their currency has been corrupted by counterfeits. Counterfeits represent a loss to these issuers, and a sufficient level of counterfeit circulation may challenge the public acceptability of a currency.

While both the public and the press are showing increased interest in counterfeiting, economists have rarely studied it. This article seeks to redress the imbalance by addressing the economic issues raised by counterfeiting. It begins with a description of the changes in technology that have heightened the potential threat from counterfeiting, followed by an examination of its economic costs to Canadians and a discussion of the usefulness of different measures of counterfeiting. It then proposes a technique for determining the extent of counterfeiting using available data and presents estimates of the extent of counterfeiting of Canadian currency.

New Challenges from Technology

The history of counterfeiting is as old as the history of money itself. The first commodity monies tempted counterfeiters to find cheaper materials to substitute for those used in the money.[3] Later, the development of paper money made counterfeiting more attractive by lowering the costs of producing money to a fraction of its value in exchange. Not all changes in the evolution of money have encouraged counterfeiting. Some, such as the move away from many private currencies to national currencies, deterred counterfeiting because the larger scale of production of legitimate currency justified greater investment in security. The move towards a national currency also meant the public would need to be familiar with the features of only one currency to protect themselves from counterfeits.[4]

For most of the twentieth century, counterfeiting was limited by the expensive investment in engraved plates and offset presses needed to produce credible forgeries. The introduction of sophisticated scanners, colour photocopiers, and ink-jet printers in the early 1990s dramatically changed counterfeiting technology by sharply lowering the costs. This change has been reflected in a marked increase in the detection of counterfeits in Canada since the early 1990s. By 2000, photocopies and ink-jet printed notes accounted for 98 per cent of all the counterfeits detected in Canada.

The introduction of sophisticated scanners, colour photocopiers, and ink-jet printers in the early 1990s dramatically changed counterfeiting technology by sharply lowering the costs.

The changing technology has also altered both the organization of counterfeiting and its vulnerability to detection. Offset printing required substantial equipment that was difficult to conceal. Moreover, counterfeits were produced in substantial runs and stored before being placed into circulation. Together, these features exposed counterfeiting operations to raids by law-enforcement authorities. The new techniques allow counterfeits to be produced on demand, reducing the need for inventories and dispersing them in a wider variety of locations, making them more difficult to find.

These changes have also altered the way in which counterfeits are detected. Since 1990, detection has shifted from the discovery of hoards of uncirculated counterfeits towards the exposure of counterfeits in circulation, which in 2001 accounted for 96 per cent of the number of counterfeits detected in Canada.

3. Commodities that can be used as a medium of exchange and a store of value are referred to as commodity monies. Historical examples include gold, silver, diamonds, cattle, and furs.

4. The exploits of the Johnson family in Canada and the United States in the 1880s illustrate the limited investment in security for some private bank notes. Speer (1904) recounts that the Johnson forgeries could be distinguished from authentic notes because they were "too perfect" and lacked the engraving flaws present in the authentic notes.

The Costs of Counterfeiting

Counterfeiting has three types of costs: redistribution costs, prevention costs, and confidence costs. The redistribution and prevention costs are similar to those of any other type of crime. The confidence costs are the consequence of the special role that currency plays in the economy.

Redistribution costs refer to the loss of purchasing power suffered by the people who end up holding counterfeits when they are discovered. This cost consists of the goods and services that victims exchange for the counterfeit notes. A further redistribution cost arises because counterfeits displace authentic notes issued by the central bank. The central bank loses its so-called seigniorage—the flow of interest it would receive from the government securities that it acquires through issuing new currency—to the counterfeiters. Economists note that redistribution costs are not a cost to the economy overall, since the losses suffered by the public and the government are matched by the gains of the counterfeiters—hence the term redistribution costs.

Prevention costs arise from the efforts that individuals, businesses, governments, and central banks take to escape bearing the redistribution costs of counterfeiting. Individuals and businesses incur costs through their efforts to avoid accepting counterfeits. Some of these costs consist of expenditures taken to identify counterfeits, such as training staff or investing in counterfeit detectors. Others arise from not using currency or specific issues of currency out of fear of accepting a counterfeit. In some cases, a specific denomination may be avoided by suffering the inconvenience of using other denominations. In other cases, using currency may be avoided by employing other forms of payment, such as cheques, debit cards, credit cards, or foreign currency, which may be less convenient.

The prevention efforts of government and central banks differ from those of individuals and businesses in that they are directed at stopping counterfeiting itself. For governments, these costs consist of the extra policing and judicial expenses. For central banks, prevention costs arise from incorporating increasingly expensive security features into currency and withdrawing from circulation and prematurely replacing issues that have become vulnerable to counterfeiting. Unlike redistribution costs, prevention costs represent a loss to society as a whole: resources are directed from other uses to the prevention of counterfeiting. If counterfeiting is typical of other crimes, the preventive costs will be a multiple of the direct costs. Brantingham and Easton (1998) estimate that total costs to Canadians from property crimes in 1996 were $11.5 billion when prevention costs are taken into account, an amount that is 2.5 times the direct cost of property crime.

The *confidence costs* of counterfeiting arise because of the special network characteristics of currency. Like a telephone, currency is of little use to a person unless others use it as well. The decision of some people to switch away from using currency will impose costs on users because they have fewer partners to transact with. If enough people lose faith in a particular denomination or in a currency as a whole, it will be compromised as a means of making payments.[5]

Perception, as distinct from reality, can be important in determining whether a currency can retain the public's confidence. When some retailers refuse to accept a particular note, this has a demonstration effect on other retailers who, although not having any unfortunate experience themselves, may decide not to accept the note. Customers may also choose not to use that note, not because they fear counterfeits, but because they fear that the notes will not be accepted.

Experience with the $100 note suggests that people may question their confidence in a currency even with relatively low levels of counterfeiting. During 2001, 46,649 counterfeit $100 notes were detected from an outstanding stock of almost 160.2 million authentic notes, or less than three counterfeits for each 10,000 authentic $100 bills in circulation. Nevertheless, this level of counterfeiting caused as many as 11 per cent of merchants in some areas to refuse to accept $100 bills (Bank of Canada 2001). To the extent that people change their currency-holding patterns, the Bank would have to bear the cost of replacing $100 bills with multiples of lower-denomination notes.

The extreme case of loss of confidence in all issues of a country's currency will require its replacement. To date, there is limited experience with respect to the point at which confidence in a currency becomes lost. In part, this is because currencies printed on inexpensive photocopiers and ink-jet printers pose a different kind of threat than in the past. Nevertheless, the costs of counterfeiting have a parallel, albeit imperfect, in the costs of inflation. Here, historical experience suggests that currency is so useful that people continue to use it even at very high inflation rates. Unlike the costs of inflation, the costs of counterfeiting are, however, disproportionately concentrated among merchants,

5. Nosal and Wallace (2001) develop a model that suggests that counterfeiting may preclude the possibility of a monetary equilibrium. This result confirms that counterfeiting is a serious threat that warrants substantial preventive actions, even though its occurrence in practice may be low.

especially fast food outlets and convenience stores, where currency is the predominant means of payment. This difference in the incidence of costs means that shifts away from currency use could take place at lower levels of overall cost than the shifts that take place as a result of inflation.

One possibility, when confidence is lost, is that a foreign currency would replace the domestic currency in circulation. Even if this can be an orderly process at the hand-to-hand currency level, costly adjustments would be required in the restatement of the accounts of financial institutions and other financial contracts into the substitute currency. Alternatively, domestic currency could be replaced by other methods of payment, such as cheques and debit cards. In this case, the costs would be less, since the currency could still be used as the unit of account even though it did not pass in circulation.

It is difficult to estimate the costs to society as a whole from losing the use of a national currency for making payments. Such a loss would initially affect everyone in the economy because of the time and effort necessary to switch to a new payments method. Over a longer period, everyone also faces the expense of using a means of payment that is less efficient than currency. For these sources of loss, even a small cost per person has substantial consequences, given that virtually everyone uses currency. In addition to these costs, the government will lose because the benefit from its central bank's seigniorage will be transferred to the issuers of the replacement for domestic currency. Future progress in the adoption and development of alternative technologies for making payments, such as debit cards or e-money, could alleviate the consequences of reduced confidence in a currency, should it occur.

Estimating the Stock of Counterfeits

The extent of counterfeiting in an economy can be measured by the current flow of recoveries or by the outstanding stock of counterfeit bills. These measures differ in their significance as well as their availability. The flow of recoveries can be measured directly and measures the costs incurred by individuals and businesses from accepting bogus currency.[6] The stock of outstanding counterfeits, on the other hand, shows the degree to which any currency, or denomination of currency, has been corrupted by counterfeits. By doing so, it provides a basis for determining the seigniorage losses to monetary authorities from the displacement of the currency they issue.[7] Equally important, it indicates the potential threat to the continued use of paper money.[8]

Unlike the flow of recoveries, the stock of counterfeits cannot be measured directly. While it might appear that the stock of counterfeits in circulation would be closely related to the flow of recoveries, this impression is incorrect. Table 1 shows that the same stock of counterfeits can be consistent with widely different levels of detection, depending on the length of time counterfeit notes remain in circulation. The 129,000 counterfeits recovered during 2001, for example, could be consistent with an outstanding stock as small as 350 if counterfeits circulate for one day, or as large as 645,000 if they circulate for five years.

Method of Estimation

In a rare attempt to measure the stock of circulating counterfeits, the U.S. Treasury (2000) used two approaches: the parts-found-in-processing (PFP) method and the life-of-counterfeits (LOC) method. Each approach has shortcomings. This article focuses on an alternative composite approach (COMP) that overcomes the

Table 1

Relation Between the Number of Notes in Circulation and the Length of Time They Circulate, Based on the Rate of Detection* for 2001

Average circulation of counterfeits	Counterfeit notes in circulation
1 day	350
1 week	2,500
1 month	10,750
1 year	129,000
5 years	645,000

*Annual rate of detection: 129,000 notes

6. Measuring total recoveries requires co-operation between policing authorities, who are responsible for determining the number of counterfeits recovered, and central banks, which detect counterfeits while processing bank notes. The Bank of Canada is unusual among central banks in publishing statistics with respect to recoveries. See Bank of Canada (various years).

7. Taxpayers are the ultimate losers in this case because the profits of the Bank of Canada are regularly transferred to the government.

8. Such a threat could materialize suddenly through the discovery of a simple test that distinguishes real from counterfeit currency. Tom Ferguson, Director of the U.S. Bureau of Engraving and Printing, related how a simple detector that left yellow marks on real bills because of their protein content was able to distinguish real U.S. currency from counterfeits. Not surprisingly, counterfeiters quickly countered by placing yellow marks on their bills to suggest that they had already passed the test. Still, this device altered the technology of counterfeit detection in a short period of time and revealed the extent of one type of counterfeiting.

limitations of the PFP and LOC methods by building on their strengths and using a richer set of data than either of the other two approaches.

Parts-found-in-processing approach

The basic PFP approach extrapolates the rate at which the monetary authorities detect counterfeits in their currency processing to the entire stock of currency. PFP would measure the stock of counterfeits accurately if (i) detected counterfeits were found only in the Bank of Canada's note processing and (ii) the notes processed by the Bank were representative of outstanding currency with respect to the share of counterfeits.

Unfortunately, the conditions necessary for the PFP method are not fulfilled. Individuals and businesses detected the majority of counterfeits in 2001, with the Bank of Canada accounting for only 22 per cent of total detections. The Bank's share of detections ranged from a high of 32.8 per cent for $10 notes (processed on average once a year) to a low of 10.6 per cent for $100 notes (processed on average once every 10 years).

The U.S. Treasury has adapted the PFP approach to account for counterfeit detections made within the private sector. The adapted version (PFP') assumes that the total detection rate per million notes in circulation bears the same relationship to the detection rate of the monetary authority as the total number of detections per year does to the annual number of detections by the monetary authority. This adjustment, however, has the shortcoming that it assumes that currency turns over in the public's transactions with the same frequency as it is processed at the central bank.[9,10]

Life-of-counterfeits approach

The LOC approach uses an entirely different starting point by extrapolating the flow of discovered counterfeits to the outstanding stock using an estimate of the life of a counterfeit. The shortcomings of the LOC approach are more practical than those of the PFP approach: data on the circulating life of counterfeits are meagre.[11]

The Composite Method

The proposed composite approach (COMP) overcomes some of the limitations of the other two methods. It recognizes explicitly that screening for counterfeits takes place both inside and outside of the Bank of Canada. The public and banks in their transactions, and the banks in their processing of currency, are the sources of screening outside of the monetary authority. The proportion of counterfeits removed from batches of currency before they are passed to the Bank of Canada will depend on the efficiency of screening when currency is transferred between individuals, businesses, and banks.

The COMP method combines elements of both PFP and LOC to estimate the stock of circulating counterfeits. Like the PFP approach, it uses data on the rate at which the monetary authority detects counterfeits in its processing. It also requires data on either the turnover of the currency or, like the LOC approach, the life of counterfeits. It also makes use of data on the annual flow of counterfeits detected outside the monetary authority.

The COMP approach makes use of the following relationships:

- the relation between the life in circulation of a stock of counterfeits and the flow of annual detections
- the turnover rate for currency implied from the estimated stock of counterfeits and counterfeit detections by the general public, and
- the relation between the stock of outstanding counterfeits and the rate of detections by the monetary authority, given the efficiency of detection by the general public.[12]

The data used for the COMP estimates are presented in Table 2.

The estimates make use of a unique set of information collected by Canadian law-enforcement authorities from the recovery of a series of high-quality counterfeit $100 notes circulating in the late 1990s. Certainly this series was atypical of counterfeit issues: its high quality brought it to the attention of the authorities and led to its being designated as a series. Moreover, the series was produced in sufficient numbers that it accounted for 80 per cent of $100 counterfeits detected during 1999.

The pattern of recoveries for this counterfeit series from 1998 through 2001 (Chart 1) shows that the number of

9. Turnover refers to the number of times a note is transferred in making transactions. The life of a note refers to the time between a note being placed into circulation and the time it leaves circulation. They are related in that notes with high turnover wear out more quickly and, as a result, have a shorter life. The relationship is not perfect because notes may be withdrawn before they are worn out.

10. This assumption would imply the following rates of turnover for Canada: $5 = once a year, $10 = once every 10 months, $20 = once every eight months, $50 = once every five years, and $100 = once every 10 years.

11. As discussed below, unique data are available with respect to one series of $100 counterfeit notes that circulated in Canada during the late 1990s.

12. The method of estimation is expressed in equation form in the Addendum to this article. The method is described more fully in Chant (2004).

Table 2

Data for Estimating Outstanding Counterfeits, 2001

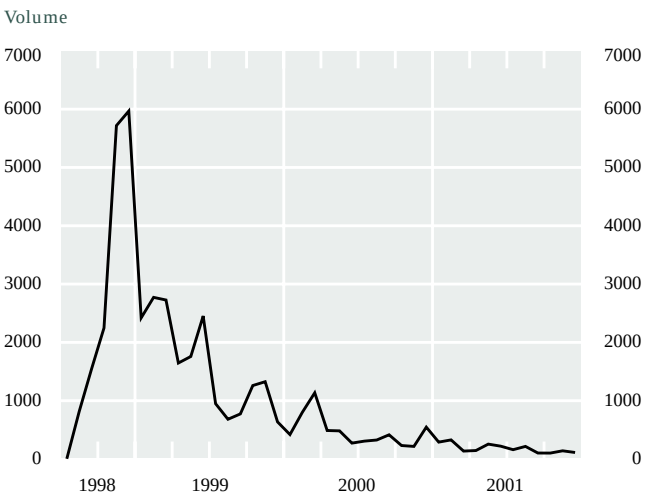
	$5	$10	$20	$50	$100	Total
Detection rate per million by Bank	13.06	147.60	26.02	39.11	264.14	49.06
Public's share of detections	0.67	0.69	0.72	0.85	0.90	0.78
Annual detections	5,306	40,791	30,839	5,275	46,649	128,860
Public detections	3,577	27,942	22,285	4,483	41,783	100,070
Life of counterfeit* (years)	-	-	-	-	1.04	-
Life of authentic notes (months)	23	22	42	73	108	-
Outstanding stocks of bank notes (millions)	145.4	94.8	504.7	97.4	160.2	1,002.5

*Derived from a designated series of $100 counterfeit notes

counterfeit notes passed reached a peak in November 1998, near the time of the arrest of the forgers, and then declined steadily thereafter. The decline, at a rate of approximately 8 per cent per month, corresponds to an expected life in circulation of 12.5 months for these notes.[13] This expected life of a counterfeit $100 note provides the anchor for the rest of the analysis.

Chart 1

Pattern of Recoveries for $100 Counterfeit Series, 1998–2001



13. The analysis makes use of the concept from physics of mean lifetime of a particle, which is expressed as the reciprocal of the rate of decay per period.

Sources of bias

The COMP estimates should be treated as conditional because their derivation is based on a number of assumptions.

- The reported recovery rate for the identified series corresponds to the actual recovery rate.
- The assumed life of counterfeits based on the identified series reflects the experience of $100 counterfeits overall.
- The relation between the life and turnover rate of notes of different denominations represents actual experience.
- All counterfeits detected in circulation are reported in the Bank of Canada data.
- Notes processed by the Bank of Canada are representative of notes in circulation.
- The Bank of Canada detects all counterfeits present in the notes that it processes.

The estimates of circulating counterfeits made on the basis of the composite method are thus conditional on these various sources of bias.[14] Only one of these biases, the one arising from the assumption that the Bank detects all the counterfeits present in the notes it processes, unequivocally leads to an underestimate of the number of counterfeits in circulation.[15] While it is possible that the Bank fails to detect all counterfeits in the notes it processes, it is unlikely that they miss a significant proportion. The Bank scrutinizes bank note deposits using public security features and features for the exclusive use of the central bank. For counterfeits to pass central bank examination, they would need to incorporate both types of security features. Another of the biases is ambiguous: failure of the assumed relation between currency life and turnover to correspond with the actual relation could lead to either an overestimate or an underestimate of circulating counterfeits. Sensitivity tests, however, suggest that even substantial differences in turnover values close to those estimated would not materially affect the estimates of circulating counterfeits.[16] It can be shown that all the remaining identified biases result in conservative

14. These sources of bias and their consequences are discussed more fully in Chant (2004).

15. The U.S. Treasury also makes this assumption in developing its estimates. Allison and Pianalto (1997) concede, however, that the Federal Reserve only detects "virtually all counterfeit notes," not all counterfeits in the notes that it processes.

16. For example, raising the assumed turnover of $20 bills by 10 per cent would raise the estimate of counterfeits outstanding by just 0.8 per cent.

estimates, in that they overstate the degree of counterfeit notes in circulation. Though the remaining bias is ambiguous, the effects are likely to be small.

The Estimates

The COMP estimates of outstanding counterfeits presented in Table 3 show a number of features of the counterfeits circulating during 2001. Counterfeiting in that year was predominantly a problem for $100 notes, which accounted for 58 per cent of the numbers and 88 per cent of the value of counterfeits estimated to be in circulation. The estimates also provide an overall indication on the significance of counterfeiting. Counterfeits appear to have accounted for no more than 0.03 per cent of outstanding notes for any denomination and only 0.008 per cent of the total number of outstanding bank notes. Counterfeits in total are estimated to have been 0.015 per cent of the value of outstanding currency.

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Table 3

Estimates of Counterfeits in Circulation by Denomination, 2001

	$5	$10	$20	$50	$100	Total
Private rate of detection (%)	5.6	5.7	8.9	10.6	12.8	-
Per million notes outstanding	13.8	156.5	28.6	43.7	302.9	83.8
Annual turnover of currency	31.6	33.0	17.3	10.0	6.7	-
Life of counterfeit in years	0.38	0.36	0.47	0.81	1.04	-
Lifetime turnover of counterfeits	11.98	12.02	8.09	8.04	7.00	-
No. of counterfeits	2,012	14,840	14,421	4,259	48,515	84,047
Share of total by number (%)	2.4	17.7	17.2	5.1	57.7	100
Value of counterfeits ($)	10,060	148,400	288,400	212,950	4,851,500	5,511,310
Share of total by value (%)	0.2	2.7	5.2	3.9	88.0	100

Source: Derived by methods described in Chant (2004)

How do these stock estimates differ from other information about counterfeits? Table 4 compares the estimates for 2001 with another measure of counterfeits, the recoveries from circulation during the same year. The comparison shows that the new estimates strengthen and reinforce the indications that counterfeiting in 2001was primarily a problem of high-denomination bills. Table 4 suggests that $5 and $10 counterfeits were much less important in 2001 in terms of circulating counterfeits than they were for recoveries. Their share fell from over 35 per cent of recoveries to just 20 per cent of the circulating stock and from 7 per cent to just 3 per cent in value. In contrast, the share of $100 counterfeits in number was almost 60 per cent higher among circulating counterfeits than it was among recoveries. The $100 notes accounted for 88 per cent of the value of all circulating counterfeits.

Table 4

Comparison of Measures of Counterfeits, 2001

	$5	$10	$20	$50	$100	Total
Recoveries						
Number	5,306	40,791	30,839	5,275	46,649	128,860
(% of total)	(4.1)	(31.7)	(23.9)	(4.1)	(36.2)	(100)
Value ($)	26,530	407,910	616,780	263,750	4,664,900	5,979,870
(% of value)	(0.4)	(6.8)	(10.3)	(4.4)	(78.0)	(100)
Estimated circulation						
Number	2,012	14,840	14,421	4,259	48,515	84,047
(% of total)	(2.4)	(17.7)	(17.2)	(5.1)	(57.7)	(100)
Value ($)	10,060	148,400	288,400	212,950	4,851,500	5,511,310
(% of value)	(0.2)	(2.7)	(5.2)	(3.9)	(88.0)	(100)

Conclusions

This article has analyzed different aspects of the recent Canadian experience with counterfeiting. Conditional estimates indicate that the incidence of circulating counterfeits in Canada is a small fraction of the forensic analyst's speculations for European and U.S. currencies noted in the introduction. The analysis suggests that the probability of any bill being counterfeit is estimated to be less than one in 10,000 for Canadian currency overall. Indications are that there was one counterfeit note in circulation for every 290 Canadians in 2001 and that the value of outstanding counterfeits was less than 19 cents per person.[17] The estimates also strengthen the perception that counterfeiting in Canada during 2001 was a greater threat for high-denomination bills than it was for low-denomination bills.

17. See the Addendum for an update to 2003.

These estimates may appear to be at odds with current perceptions of the severity of counterfeiting. This difference may be understandable because the costs of accepting bogus currency tend to be concentrated among "small ticket" retailers such as fast food outlets and convenience stores. Dealing with these merchants gives passers of counterfeit bills the opportunity to receive authentic currency as change when paying for small purchases with high-denomination bills. Small retailers are especially vulnerable because they tend to rely more than others on part-time, less-skilled employees. In some areas of the country, merchants have focused attention on counterfeiting by refusing to accept some denominations, like the $100 bill.

Another perspective on the costs of counterfeiting comes from comparing losses from counterfeiting with those from other payment mediums. The Canadian public lost less than $6 million from accepting fake currency during 2001 while, in comparison, total losses from bank credit card fraud exceeded $142 million, more than 20 times as much.[18] These differences appear much larger than can be accounted for by payments transacted by each method of payment. Currency would need to turn over just slightly more than three times per year to support the volume of transactions made by credit cards. Our estimates of turnover range from just under 7 for the $100 note to more than 30 for the lowest denomination notes.

The Canadian public lost less than $6 million from accepting fake currency during 2001 while, in comparison, total losses from bank credit card fraud exceeded $142 million, more than 20 times as much.

The method proposed in this article could be extended to cross-country and historical comparisons if information about the critical variables with respect to the circulating life of counterfeits were available. Such an extension could exploit the variety of different security devices in national currencies at different times and across various denominations in order to assess their effectiveness.[19] The results of such an analysis could provide the basis for the development of further measures to prevent counterfeiting.

The probability that counterfeit notes accounted for approximately 0.008 per cent of the currency in circulation in 2001 should not be grounds for complacency: the technology available to counterfeiters continues to advance. Public policy towards counterfeiting will be influenced by an inherent paradox of crime prevention: the threat of a crime, in some sense, is not measured by actual crime rates, but by the rates that would be observed in the absence of prevention. The observed counterfeiting levels reflect the substantial expense of features such as elaborate designs, security devices, and distinctive paper incurred by the Bank of Canada to prevent the illicit duplication of its currency; the private costs borne mainly by retailers in their efforts to avoid accepting counterfeits; and the public costs of education, policing, and the administration of justice. Assuring appropriate policy responses to the threat of counterfeiting, including those of law-enforcement agencies and courts, is vital because failure to deal with counterfeiting could possibly threaten the public's confidence in all or a part of a country's currency.

Public policy towards counterfeiting will be influenced by an inherent paradox of crime prevention: the threat of a crime, in some sense, is not measured by actual crime rates, but by the rates that would be observed in the absence of prevention.

For information on how to authenticate a bank note, visit the Bank of Canada's Web site at <http://www.bankofcanada.ca/en/banknotes/counterfeit/index.html>.

You can also find information by contacting the Bank directly: E-mail: education@bank-banque-canada.ca

Telephone: 1-888-513-8212

18. The costs from credit card fraud are rarely borne directly by the cardholder, given that card agreements generally limit the cardholder's losses. Nevertheless, these losses are a cost of business for card issuers and will be reflected in merchant banking fees and consumer credit charges, rather than being charged against victimized retailers or cardholders. See the Canadian Bankers Association Web site at http://www.cba.ca and click on Resource Centre/Statistics for statistics on credit card losses.

19. In addition, any such study would need to take account of other factors that may influence the incidence of counterfeiting, such as a country's level of income, the effectiveness of its law enforcement, and cultural factors.

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Addendum: Estimating the Stock of Counterfeit Notes in Circulation, 1993–2003

Varya Taylor, Department of Banking Operations

The number of counterfeit detections in Canada has grown significantly since 2001. These detections rose from 128,920 in 2001 (with a face value of $6.0 million) to 208,470 ($4.9 million) in 2002 and 443,300 ($12.7 million) in 2003.

In this addendum, the methodology developed by Chant (2004)[1] is used to estimate the stock of counterfeits in circulation from 1993 to 2003. Related estimates of the public's ability to detect counterfeits, annual turnover of counterfeits, and the average life of a counterfeit are also examined.

Chant's "composite approach" to estimating the stock of counterfeits recognizes that the stock of outstanding counterfeits depends on the life of counterfeits (L), which in turn depends on central bank processing (p), and the detection ability of the public (e).

The approach exploits the information contained in public detections (PD) and Bank detections (BD) to derive key parameters of the model as:

$$\frac{e*T}{(1-e)} = p*(PD/BD) \qquad (1)$$

$$(1-e)*L = \frac{BD/p}{BD+PD} \qquad (2)$$

where T represents the number of times a counterfeit circulates per year, otherwise known as its turnover rate (see Box).

Chant's model is based on three key relationships:

Public detections (PD) depend on the ability of the public to recognize a counterfeit note ($0 < e < 1$), the number of counterfeits in circulation (C), and the turnover rate (T)

$$PD = e*T*C. \qquad (i)$$

Since the Bank of Canada will detect all remaining counterfeits that it receives in processing, **Bank detections** in any period (BD) will depend on the proportion (p) of total notes in circulation that the Bank **processes** during that period:

$$BD = p*(1-e)*C. \qquad (ii)$$

The **average life** (L) of a counterfeit is defined as the ratio of the stock of counterfeit notes in circulation to the annual flow of total detections:

$$L = \frac{C}{BD+PD}. \qquad (iii)$$

Chant uses unique information on the *life* of a particular $100 counterfeit to derive turnover and efficiency from equations (1) and (2). Given turnover of the $100, the turnover of other denominations is set by assuming a relation of proportionality between turnover and the average life of bank notes, and other parameters are derived accordingly.

One way to use the model in a time-series perspective is to hold one of the three parameters (e, T, L) constant at its estimated 2001 value and derive the other two from the above equations.

1. "Counterfeiting: A Canadian Perspective," Bank of Canada Working Paper (forthcoming), Ottawa: Bank of Canada.

The Estimates

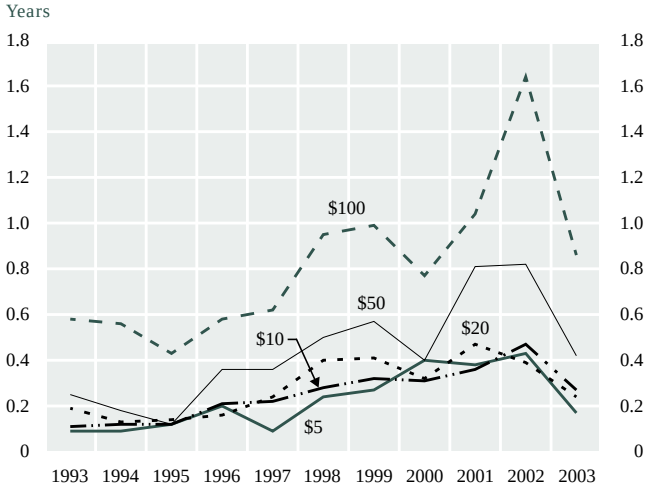
In this exercise, two cases are examined: one in which the efficiency of public screening (e) is held at its estimated 2001 value, and one in the which annual turnover rate (T) is held fixed at its estimated 2001 value. The assumption of a constant average life of counterfeits is not contemplated because it is violated by the data. In some periods, for example, 2002 in the case of the $100 note, the right-hand side of equation (2)—which is a fraction of the counterfeit life—is already larger than the 2001 estimated average life.

Constant Efficiency of Public Screening

Chart A1 plots the estimated life of counterfeits for all denominations on the assumption of a constant efficiency of public screening. The overall rise in counterfeit lives would be consistent with the significant decline in the Bank processing rate following the introduction of the Bank Note Distribution System in 1997 (Chart A2).[2] However, the sharp rise in the average life of the $100 counterfeit bills in 2002 suggests a drop in turnover, perhaps the result of retailers refusing to accept that note.

Chart A1

Average Counterfeit Life with Efficiency Constant at 2001 Levels



2. Rates of processing bank notes at the Bank of Canada fell sharply following the implementation of the Bank Note Distribution System. For example, in 1996, 1.8 billion notes were processed, compared to 608 million in 2003. With less processing, the rate of Bank detections relative to public detections has declined. For further reading on the implementation of the new system, see Bilkes (1997).

Chart A2

Bank of Canada Processing Rates by Denomination

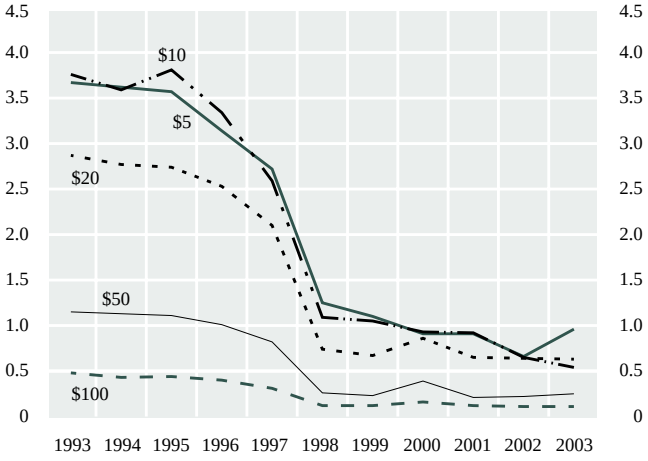
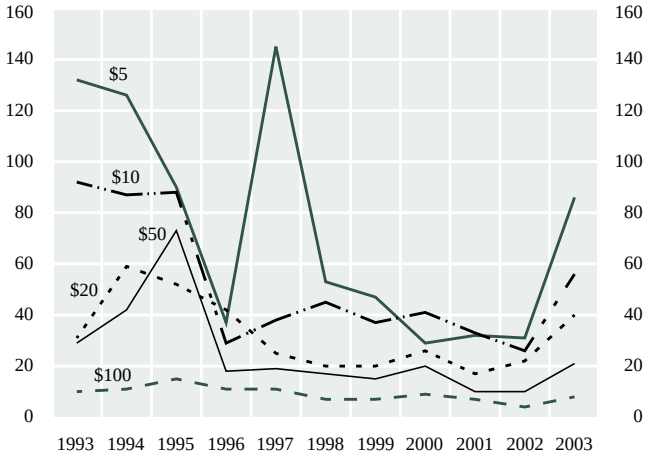


Chart A3

Annual Turnover with Efficiency Constant at 2001 Levels



The broad-based decline in counterfeit lives in 2003 that resulted from the relatively high level of public detections that year suggests an increase in the rate of public efficiency (consistent with increased public awareness) or a rise (unexplained) in turnover.

Chart A3 shows the annual turnover rates estimated for each denomination on the assumption of a constant rate of public efficiency. It shows a trend decline broken by a sharp increase in 2003 across all denomi-

Chart A4

Outstanding Counterfeits in Circulation with Efficiency Constant at 2001 Levels

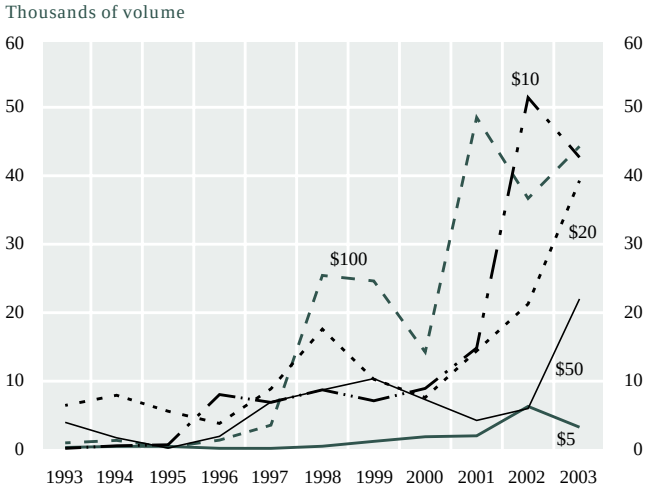
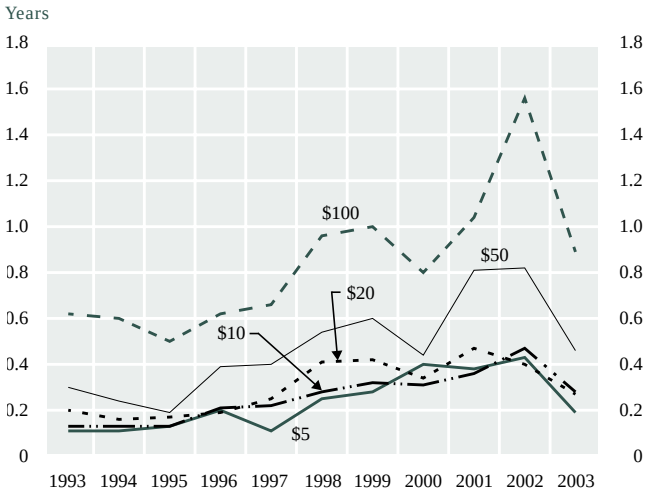


Chart A5

Average Counterfeit Life with Annual Turnover Constant at 2001 Levels



nations. The turnover of the $5 note stands out as particularly erratic; the spike in 1997, which is attributable to a large increase in public detections relative to Bank detections, is magnified by the small number of counterfeits. The same is true of the 1995 spike in the turnover of the $50 note.

Chart A4 illustrates the growth in the stock of counterfeits over the past decade on the assumption of constant efficiency of public screening.[3] Historical peaks are found in 2001 for the $100 note, in 2002 for the $5 and $10 notes, and in 2003 for the $20 and $50 notes. The highest stock of *total* counterfeits in circulation occurs in 2003, and is estimated at 151,550 notes, for a total value of $6.8 million. This represents a 25 per cent increase in volume and a 37 per cent increase in value from 2002, or an 80 per cent increase in volume and a 23 per cent increase in value from 2001. Significantly, the increase in the estimated *stock* of counterfeits is considerably less than the increase in the annual *flow* of counterfeits detected.

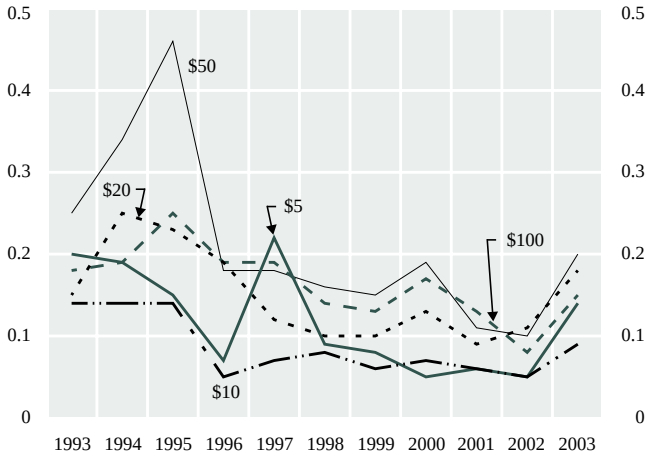
Constant Turnover

Alternatively, we can hold annual turnover constant at 2001 levels and allow counterfeit life and public efficiency to vary. As seen in Chart A5, average counterfeit life again follows a steady upward trend, followed by a drop in 2003.

3. The stock of counterfeits is estimated from equation (ii) in the Box on page 51.

Chart A6

Efficiency of Public Detection with Annual Turnover Constant at 2001 Levels



Public efficiency rates derived on the assumption of constant turnovers (Chart A6) remain fairly stable from 1997 onwards, with a slight downward trend until a pickup is observed in 2003. Increased public efficiency in 2003 coincides with the high volume of counterfeits detected by the public that year and may have been a result of media coverage and joint education efforts by the Bank of Canada and police services.

Chart A7

Outstanding Counterfeits in Circulation with Annual Turnover Constant at 2001 Levels

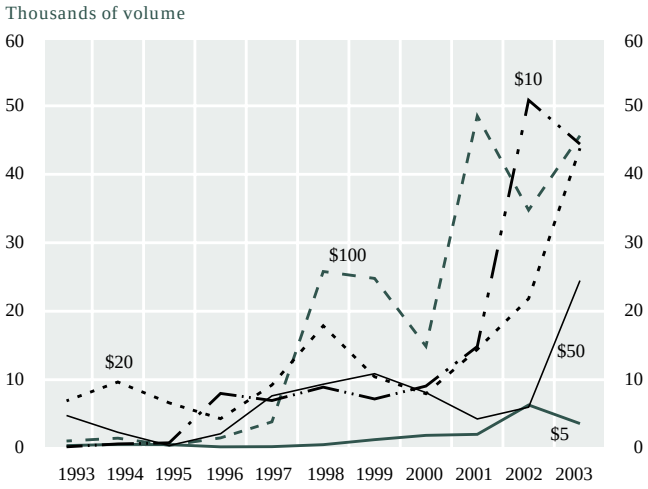


Chart A7 shows that when turnover is held constant, the total stock of counterfeits is estimated as 161,900 in 2003, for a value of $7.1 million. As in the first case, this represents a historically high volume and value of counterfeits in circulation, but a smaller increase over 2001 in the stock of counterfeits than in the annual flow of detections.

Conclusion

Estimating the equations over a span of ten years yields interesting insights into the public's ability to detect counterfeits, the average life of counterfeits, turnover rates, and changes in the stock of counterfeits.

Holding either turnover or the rate of public efficiency constant produces a gradual rise in the estimated average life of counterfeits. This seems plausible, given the changes in bank note processing since 1997. When *public efficiency* is held constant, the rise in counterfeit life would also be associated with a fall in turnover (which is not implausible, given the increased use of debit cards as a substitute for cash). When *turnover* is held constant, the rise in counterfeit life would be associated with a decrease in the public's ability to detect counterfeit notes (which is also plausible, given that improvements in reprographic technology augmented the quality of counterfeits). The truth may lie in between these two cases. Since both yield similar estimates for the stock of counterfeits in circulation, the range of probable outcomes is found to be fairly narrow (151,500 to 162,000 in 2003).

The results show a marked change in the state of counterfeiting since 2001.The incidence of counterfeiting has nearly doubled since then and is no longer primarily limited to the $100 note. In 2003, the probability of a note being a counterfeit is estimated to be highest for the $10 note, at 0.05 per cent (or 5 in 10,000), followed by the $50 and $100 notes, at 0.02 per cent, the $20 note at 0.007 per cent, and the $5 note, at 0.002 per cent (2 in 100,000 notes).[4]

Interestingly, the data on the ratio of public to Bank detections suggest that the turnover of the $100 note declined temporarily in 2002 (consistent with anecdotal evidence of reduced acceptance of that denomination among retailers). The data further suggest that the public efficiency rate rose in 2003 (consistent with increased public awareness of counterfeiting).The increase in efficiency would explain the sharp drop in the average life of a counterfeit observed in 2003.

The Bank is continuing to introduce a new series of bank notes with more advanced security features to discourage present and future counterfeiting activity. In addition, the Bank uses educational initiatives to increase public awareness. The quantum increase in bank note security is evident in the new $100 note in the *Canadian Journey* series, issued in March 2004. It will be followed by the release of the new $20 note in September 2004 and the new $50 note shortly after.

4. The new $100 note introduced in March 2004 incorporates advanced security features that have successfully deterred counterfeiters. The probability of a new $100 bill being a counterfeit is thus close to nil at present.

Speeches

Introduction

The two speeches published in this issue of the *Review* both deal with the impact of globalization. At the international level, Governor David Dodge's 24 June remarks to the European Economics and Financial Centre in Paris focused on the need for policy-makers to co-operate in the sharing of information and views on monetary and fiscal policy. Speaking to the Hamilton Chamber of Commerce on 16 June, Governor Dodge noted the many changes in the global economic environment in recent years and stressed the need for Canada to continue to adopt the right policies to be ready for new opportunities and challenges in the years ahead.

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

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 by David Dodge to the Council of the Americas, New York City, N.Y.
15 April 2004	Opening statement following the release of the *Monetary Policy Report*
16 March 2004	Remarks to an event hosted by the Center for Financial Stability and the Canadian Embassy, Buenos Aires, Argentina
10 March 2004	Remarks to the Brazil-Canada Chamber of Commerce, São Paulo, Brazil
17 February 2004	Remarks to the Mexican Business Coordinating Council, Mexico City, Mexico
22 January 2004	Opening statement following the release of the *Monetary Policy Report Update*
17 November 2003	Remarks to the Office for Partnerships for Advanced Skills Annual Visionary Seminar, Ottawa, Ontario
3 November 2003	Remarks to the David Dodge Tribute Dinner hosted by the Canadian Foundation of Economic Education, Toronto, Ontario
23 October 2003	Opening statement to the Senate Banking, Trade and Commerce Committee
22 October 2003	Opening statement at the House of Commons Finance Committee following the release of the *Monetary Policy Report*
	Opening statement following the release of the *Monetary Policy Report*
10 September 2003	Remarks to the Vancouver Board of Trade, Vancouver, British Columbia
5 September 2003	Remarks to the Spruce Meadows Roundtable, Spruce Meadows, Alberta

Co-operation and the Conduct of Economic Policy

Remarks by David Dodge
Governor of the Bank of Canada
to the European Economics and Financial Centre
Paris, France
24 June 2004

Good afternoon, ladies and gentlemen. I am delighted to be here and to have the opportunity to speak at this conference.

The theme of this event is "Policy Coordination in an Integrated Global Economy." It seems as if the idea of policy coordination is making a comeback these days. This is probably because of the growing interconnectedness of the global economy and the series of shocks that have recently reverberated around the world. While globalization has affected different countries to varying degrees, it has brought many benefits to the world economy—including increased trade, broader sources of financing, and more rapid diffusion of technology. But globalization has also left countries more exposed to developments beyond their borders.

From a central bank perspective, globalization has made the conduct of monetary policy somewhat more challenging. In order to gauge the prospects for the domestic economy, it is more and more necessary for central bankers to take into account how their economy will be affected by events elsewhere. And of course, central bankers in very large economies must be cognizant of the effects that their actions may have on the global economy and, hence, on their own economy. Canada has had a very open economy for many years. So, not only is it in our interest to ensure that our domestic economic policies are the right ones, it is also in our interest that other countries pursue appropriate policies. As globalization continues, it will increasingly be in everybody's interest that all countries follow sound economic policies.

The scope for macroeconomic policy coordination *is very limited, although it is vital for policy-makers to* co-operate *in the sharing of information and views.*

Given this growing integration of the world economy, it might appear that there is a need for closer international coordination of economic policies. Traditionally, talk of coordination has made people think of more formal arrangements, such as the Plaza and Louvre Accords of the 1980s. Not only did those agreements attempt to influence global exchange rates, they spelled out detailed prescriptions for individual countries in areas such as fiscal and monetary policy.

I will argue today that the scope for macroeconomic policy coordination is very limited, although it is vital for policy-makers to co-operate in the sharing of information and views on monetary and fiscal policy. But I will also argue that there are some areas where coordination is required, most particularly in establishing and maintaining rules and standards that will allow global financial markets to function well and global trade to expand.

The Right Economic Policies

Let me start with macroeconomic policies and information sharing. I'll begin with a question. If there is no international macroeconomic policy coordination, how can countries determine which policies they should choose to strengthen their domestic economies and thus contribute to global growth?

In answering that question, I would say that policy-makers should always look to their own economies first. Promoting policies that encourage sustainable growth and financial stability in their own domestic economy is the best contribution that national authorities can make to the growth and stability of the global economy.

But which policies are the right ones? The OECD, among other organizations, has been working on this question for decades. I can recall attending OECD meetings here in the 1980s, when a consensus began to take shape on a set of policies that would provide the strongest base for sustainable economic growth. These policies relate to four basic areas. First, monetary policy should be directed at keeping inflation low and stable. Second, fiscal policy should take a disciplined approach to the public purse. Third, structural policies should encourage economic flexibility. And fourth, countries should work towards trade liberalization. Let me take a few minutes to discuss these areas, beginning with monetary policy.

Policy-makers should always look to their own economies first.

In Canada, as in many other countries, the goal of monetary policy is to maintain the public's confidence in the future value of money. We do so by working to keep inflation low, stable, and predictable. Over the years, the Bank of Canada, like many other central banks, has struggled to find the right anchor for its monetary policy—an anchor to guide its actions and to give the public a way to measure its performance.

Since 1991, our monetary policy anchor has been our system of explicit inflation targeting. Under this system, we aim for a 2 per cent annual rate of consumer price inflation over the medium term. This target is spelled out in a formal agreement between the Bank and the Government of Canada. But the Bank is solely responsible for the implementation of monetary policy.

It's important to note that we conduct our policy *symmetrically* around the 2 per cent target. We will lower interest rates to stimulate total demand when we see that the trend of inflation is threatening to fall below the target over the next 18 to 24 months. Similarly, we will raise interest rates to dampen demand when we see that the future trend of inflation is poised to rise above the target. In this way, monetary policy acts as the primary tool for stabilizing the economy.

Although inflation targeting has a relatively short history, the experience of many countries so far suggests that this approach brings with it important economic benefits. By smoothing the peaks and valleys of the economic cycle as a whole, inflation targeting helps the economy to achieve maximum sustainable growth over the medium term.

But if a central bank wants to have the monetary policy independence needed to pursue low and stable domestic inflation, then it has to be prepared to allow the external value of its currency to fluctuate. That independence, which is typically lost under a fixed exchange rate regime, has been a tremendous asset for Canada. Further, given the somewhat sticky nature of both wages and prices, a floating exchange rate can serve as an important economic stabilizer, helping to facilitate the adjustment to shocks and the resolution of global imbalances.

It is true that, under a floating exchange rate regime, currencies can experience short-term volatility. This volatility can certainly be unnerving. However, in my view, central bankers ought to be extremely cautious about trying to smooth these fluctuations. It is extraordinarily difficult to judge whether sharp currency movements simply represent market "noise" or more fundamental forces. So, there is great potential for policy error when central bankers try to smooth currency volatility. Besides, businesses can take advantage of highly efficient hedging tools available in financial markets to help them deal with short-term currency movements.

Let me now turn to fiscal policy. A country should have a medium-term fiscal plan that is appropriate to its particular situation. Citizens and investors need to know that their government will not let debt levels get out of hand. When public debt is controlled, people can have confidence that their governments will not

inflate the debt away, impose an overly onerous tax burden in the future, or simply repudiate the debt.

In attempting to keep levels of public debt under control, governments should be wary of using "discretionary" fiscal policy to stabilize the economy. Let me be clear that I am talking here about discretionary action and not the use of automatic stabilizers, such as unemployment insurance payments. For one thing, it is very difficult to get the timing of discretionary action correct. For another, as we know from bitter experience around the world, tightening fiscal policy is politically much more difficult than easing it. And so the use of discretionary fiscal policy as an economic stabilizer increases the chances of a country getting into an unsustainable debt situation. Further, the economic evidence suggests that, in open economies under a floating exchange rate regime, monetary policy can be a much more effective stabilizer than discretionary fiscal policy.

In the 1990s, governments in Canada—both federal and provincial—struggled not only to eliminate budget deficits, but to run surpluses in order to bring down public debt-to-GDP ratios. Given Canada's demographics, with an aging population and a workforce that is likely to stop growing within 15 years or so, aiming to reduce the debt-to-GDP ratio is an entirely appropriate fiscal anchor. Of course, other countries may have different considerations that shape their medium-term fiscal plans.

The Importance of Information Sharing

So far, I have argued that formal coordination of macroeconomic policies is unlikely to lead to better economic outcomes than if all countries simply followed the right policies for their own circumstances. In addition, coordination risks amplifying the effects of a mistake in judgment about the state of the global economy. But co-operation in the form of information sharing does play an extremely important role in the development of macroeconomic policy.

Let me elaborate. Countries can put an appropriate policy framework in place; but, without accurate and reliable information on the state of other economies, it is difficult to determine what policy actions will deliver optimal results. The Canadian economy provides a clear example. Given Canada's dependence on international trade, the Bank of Canada needs to thoroughly understand the forces at work in the world economy in order to adopt the appropriate monetary policy stance at home. Otherwise, we risk misjudging the state of total demand in the domestic economy, and that can lead to policy errors.

The increasingly interconnected nature of the world economy means that policy-makers in all countries must have a thorough understanding of global economic and financial developments. It is fitting that we should be discussing this topic here, in this building, given the OECD's long history in economic co-operation.

How does this information sharing among countries take place? In addition to OECD meetings, central bankers gather at the Bank for International Settlements every two months. In fact, I will be headed to Basel for such a meeting in a couple of days. One of the most important features of these meetings is our systematic, detailed discussion of the world economic situation. These meetings, as well as the periodic meetings of the International Monetary Fund, the G-7 and G-20, and the Financial Stability Forum, are important opportunities for policy-makers. Not only can we hear directly from our counterparts, but we also have the chance to ask questions about their policies and prospects. And between these meetings, senior officials from finance ministries and central banks talk frequently to each other.

The increasingly interconnected nature of the world economy means that policy-makers in all countries must have a thorough understanding of global economic and financial developments.

This kind of information sharing can also be useful in areas other than macroeconomic policy. I mentioned before that the OECD policy consensus includes the idea that countries should strive for economic flexibility through their structural policies. In particular, that means the creation and maintenance of effective and efficient labour and capital markets. Again, the sharing of information about experiences and best practices can be invaluable in helping authorities design policies and programs that are appropriate to their own econo-

mies. Information sharing can also help to reduce uncertainty and to promote economic security by demonstrating the most effective ways to strengthen the rule of law and reduce the risk of abuses. And information sharing is an important part of the effort to combat money laundering and terrorist financing—an effort led by the Financial Action Task Force here in Paris.

Where Coordination Can Be Helpful

So is there any scope for outright policy coordination in a global economy? As I said at the beginning, I would argue that, when it comes to international trade and finance, actual coordination is not only desirable, it is probably necessary to facilitate the expansion of commerce and to promote well-functioning global financial markets.

Let me explain, starting with international trade. A moment ago, I said that trade liberalization is a crucial part of an appropriate economic policy framework. But in order to have freer trade worldwide, countries need to come together to draw up and enforce a set of rules governing the exchange of goods and services. In this regard, Canada has been a consistent supporter of the World Trade Organization (WTO) and its earlier incarnations.

When it comes to international trade and finance, actual coordination is not only desirable, it is probably necessary.

Unfortunately, in recent years, there has been insufficient international support for strengthening the global trade order, and talks on difficult sectors, such as agriculture, have floundered. Collectively, developed countries still have a considerable way to go in terms of reducing subsidies and liberalizing trade for a number of goods, including agricultural products. In my view, we have a responsibility to do this in order to promote growth in the most impoverished nations. That is why Canada has been pushing for an early resumption of the Doha round. And there are other sectors, such as financial services, where major effort is required. This effort must be made so that the global economy can benefit. It won't be easy; but, in the long run, it will be worth it.

International coordination is also important in efforts to establish a framework to allow financial markets to function efficiently. In recent years, this has been reflected in the drive towards greater transparency. Unless countries develop and implement a clear and coherent way of disseminating relevant information, global financial markets will be unable to function at peak efficiency. This applies to both the public and the private sectors. Following the Asian and Russian crises of 1997-98, the IMF and the World Bank launched the Financial Sector Assessment Program to identify strengths and weaknesses in national financial systems. This effort is backed by Reports on Observance of Standards and Codes, which are conducted by the IMF. These reports can bolster confidence by demonstrating to markets the level of commitment that countries have to boosting their transparency. Other efforts to improve transparency in the wake of Enron and similar scandals include initiatives to improve corporate reporting, accounting, and dissemination of financial market information.

These efforts to further domestic transparency will certainly be helpful on their own. But if we coordinate our efforts, we can spread the benefits of transparency and help global financial markets to operate more efficiently. This applies to the development of market codes of conduct, as well as to compliance and enforcement efforts. And it also applies to the development of accounting standards that are universally applicable. It is only through coordination that we will all get the full benefit of improved standards and codes.

Unlike macroeconomic policy, where the best collective outcome depends on each country following appropriate domestic policies, when it comes to international trade and global financial markets, the best collective outcome will require strong, coordinated efforts.

Conclusion

Let me sum up. As globalization continues, it may appear that there is a need for national authorities to coordinate their macroeconomic policies through formal agreements and arrangements. I have argued that this is not the case. I hope that I have convinced you that such coordination is unlikely to be helpful. But I

hope that I have also convinced you that information sharing among countries remains extremely important. What is crucial is that national authorities pursue sound domestic policies, while being fully cognizant of what is happening elsewhere in the world. These policies include a well-anchored monetary policy focused on inflation control and a prudent fiscal policy conducted within an appropriate medium-term plan. Such policies should be supplemented by a set of structural policies that foster economic flexibility, as well as by policies that encourage openness to international trade. By strengthening their domestic economies while taking global developments into account, policy-makers will be helping to improve the world economy.

Where I think we do need coordination is in the establishment of frameworks that facilitate international commerce and strengthen the global financial system. We do need a coordinated international trade order, and the strengthening of that order remains a worthy goal for us all. We do need a coordinated, transparent framework to support and maintain effective and efficient global capital markets. And we do need to promote the coordination of accounting standards.

Where I think we do need coordination is in the establishment of frameworks that facilitate international commerce and strengthen the global financial system.

Finally, let me say that, as we take part in this conference here, at the home of the OECD, economic co-operation remains as important now as it was on the day that organization was founded. The sharing of information among national governments and regulatory bodies is absolutely essential. Co-operation helps policy-makers follow sound domestic economic policies appropriate to their own circumstances while being cognizant of the actions of others. That, in turn, should lead to better global economic performance.

The Changing World Economy: What It Means for Canada

Remarks by David Dodge
Governor of the Bank of Canada
to the Hamilton Chamber of Commerce
Hamilton, Ontario
16 June 2004

Good afternoon. I am very glad to be in Hamilton today. This city has undergone tremendous change over the past couple of decades, and it's certainly exciting to see the revitalization efforts taking place here. And now, Hamilton is working to diversify its economic base. It's obvious that adjusting to change is not a new thing for Hamiltonians.

The same is true of the Canadian economy, which must always adjust to changing domestic and world circumstances. During 2003 and so far this year, some of those adjustments may have felt more like overhauls, particularly for some manufacturing firms here in Ontario.

One of the most important changes that we have all seen since 2002 has been the realignment of major currencies in the face of global trade imbalances. This has been driven primarily by weakness in the U.S. dollar against other currencies, including our own.

A second change has been the weaker demand for Canadian exports in 2002 and 2003. In addition to the exchange rate effects, some of this weakness has been linked to growing competitive pressures arising from the rapid integration of China and, to a lesser extent, India, into the global economy. These countries are becoming increasingly important exporters and importers of a wide range of goods and services.

Third, last year, the Canadian economy faced a number of specific domestic shocks, such as SARS, mad-cow disease, floods, fires, and the power blackout in Ontario. All of these developments since 2002 have left us with an economy that is operating below its production potential.

I'll come back to Canada's specific economic outlook later on. But I'll spend the bulk of my time today discussing the major changes that are taking place in the global economy, and how Canada is adjusting to this new environment. I will also talk about how the macroeconomic framework we have developed in Canada during the past couple of decades gives us more flexibility to adjust to global economic shocks and to embrace the new opportunities that change brings.

The Only Constant Is Change

We've all heard the old saying that the only thing we can be sure of is change. And we have certainly seen sweeping changes in the world economy over the past 20 years. Today, we are seeing significant swings in the balance of economic power, as large emerging markets have opened up to trade.

But let's remember that integrating new regions of the world into the international trade order is not a new phenomenon. Since the early nineteenth century, various countries have emerged at different times as major forces on the international economic scene.

After the Second World War, the world trade order, which had broken down in the 1930s, had to be rebuilt. The war-torn countries of Western Europe were slowly reintegrated back into that order. Through the 1950s and 1960s, Japan re-emerged as a major economic power.

Then Korea took off in the 1970s, followed by other so-called "Asian tigers" during the 1980s and 1990s. Now, it's China's turn. And India is not far behind.

Today, we are seeing significant swings in the balance of economic power, as large emerging markets have opened up to trade.

What makes the ascent of China and India different from that of other countries is their sheer size. Together, these two countries represent close to 40 per cent of the world's population. Their combined economies, measured on the basis of purchasing-power parity (which compares economies by equalizing the purchasing power of their currencies for a similar basket of goods and services) add up to more than 85 per cent of the U.S. economy. In fact, by that measure, China's economy is the second largest in the world, after that of the United States, and India's is fourth, after Japan's. Their influence is intensifying the competitive pressure facing producers in other countries, including Canada. But it also means new, fast-growing sources of demand and new opportunities for us. Let's remember that some of the early emerging-market economies have become important markets for Canadian goods and services. The integration of China and India into the world trade order is taking place as other emerging-market economies, such as Mexico and Brazil, continue to carve out their niches in world markets.

Now, I'd like to spend a few minutes discussing the adjustments that all open trading nations must make in this changing environment, and recall some of the lessons that past adjustments have taught us.

Benefits of International Competition

First, let me say a few more words about the competitive environment. Not surprisingly, some perceive the growing competition from China and India as a threat. Companies everywhere are under constant pressure to lower costs, and many of them are finding that China and India are attractive places to establish production facilities and service centres. The loss of certain jobs in the home countries of those companies is a sensitive social and political issue and can contribute to protectionist pressures, especially during periods of relative economic weakness.

But as we consider the impact of increased competition from Asia, it is important to remember that economic growth in Asia is lifting hundreds of millions of people out of poverty. That's an absolute good. And it is a new source of opportunity, creating more demand for goods and services from the industrialized countries and thus providing a boost to global economic growth.

Healthy Financial Systems

As our economies have become more open, we have also been reminded of the importance of a solid, efficient financial system. In any country, growing firms need access to credit from a sound, well-functioning financial sector, including a healthy banking sector. Countries with strong financial systems are much less likely to trigger or to amplify international financial crises than countries where those systems are weak. With the increasing integration of world markets, it is in everyone's interest to promote efforts to limit the impact and the spread of financial shocks.

Since the Asian and Russian financial crises of 1997–98, countries have worked to improve the transparency and reliability of their domestic financial systems. Mexico, for example, has made tremendous efforts to improve the health of its banking sector, partly by drawing on the sound business practices of large banks from other countries, including Canada. In some countries, however, progress is less evident. And in China, the building of a strong commercial banking sector presents an enormous challenge.

But it is not just domestic financial systems that need to be strong and flexible. As the global economic environment evolves, it is important that international financial institutions adjust in response. That is why institutions such as the International Monetary Fund and the World Bank must continue to modernize themselves, to remain relevant in a changing world. While the IMF and the World Bank have evolved somewhat since their creation in 1944, they have changed much less than the global economy they oversee. So it is encouraging that a strategic review of their mandates and operations has begun. This review is a first step towards a much-needed updating of these institutions.

Commodity Price Adjustments

I've spent some time outlining some of the structural forces at work in the world economy. Now I'd like to talk about some of the adjustments that are being made following the recent sharp rise in global demand.

The first adjustment is to higher commodity prices. The rapid growth of some emerging-market economies and the strong recovery in the United States are fuelling demand for raw materials. And that, in turn, is pushing up the prices of these raw materials. Certainly, we have seen the effect of this demand on most commodity prices.

Of course, one price increase that we all feel acutely is that of oil. The recent surge in crude oil prices is another example of pressure stemming, at least in part, from strong world demand. This stronger demand has not yet been met by compensating growth in the supply of crude oil—although a recent agreement by OPEC to boost production will help. Nor have we seen substantial efforts by price-sensitive consumers to use less oil and gas. Meanwhile, geopolitical events have contributed to concerns about potential supply disruptions, exacerbating the run-up in oil prices.

It is reasonable to expect that oil prices will remain relatively high until some of the geopolitical uncertainty dissipates, world production capacity expands, and further conservation efforts take hold. Higher energy costs mean that it will be more expensive to produce many goods and some services. It is not clear to what extent companies will be able to offset rising costs and limit price increases to consumers.

What is clear is that economies need to adjust to these higher costs—and economic policies must support that adjustment. We have learned this from the mistakes made during the oil crisis of the 1970s, when many countries, including Canada, tried to shield their economies from the effects of rapidly rising energy prices. The result was an eventual adjustment that was slower and more painful than it needed to be.

A Return to More Normal World Interest Rates

A second adjustment underway in the global economy is the return to more normal interest rates and somewhat wider spreads on risky investments.

After the global economic slowdown of 2000 and the terrorist attacks of 11 September 2001, central banks around the world lowered their policy interest rates to provide the liquidity to help their economies recover and absorb excess capacity. The world economic recovery we are seeing is due, in large part, to accommodative monetary policy—that is, historically low interest rates. Through 2003 and the early part of 2004, interest rates in some countries hit their lowest levels in 50 years, and global credit conditions were very expansionary.

But we know from experience that, as growth resumes and economies get closer to their production capacity, inflationary pressures start to build. And so central banks in many countries will have to remove some of the stimulus, and interest rates around the world will have to return to more normal levels. This process has already started, with market rates adjusting in anticipation of future increases in policy interest rates. There is no doubt that, over the next year, we will see upward adjustments in policy interest rates around the world. The timing and the magnitude of these adjustments will vary from country to country, according to each one's economic circumstances.

The good news is that all this is happening before economies reach the limits of their production capacity, and before inflation takes off and inflation expectations start to rise. That bodes well for sustained economic growth without the credit crunches or accelerating inflation that occurred in earlier global business cycles.

There is no doubt that, over the next year, we will see upward adjustments in policy interest rates around the world.

I have painted a reasonably sanguine view of the world economy and its ability to meet challenges. I don't mean to suggest, however, that there aren't any economic risks in the adjustments that I have outlined. As you all know, we are again facing heightened geopolitical uncertainties. And there are significant global economic imbalances that must be corrected over time. But, over the past couple of decades, central bankers and governments, as well as corporations and financial institutions, have learned a great deal about

managing global risks. And most countries agree on the critical elements and policies necessary to adjust to global economic change.

How Well Is Canada's Economy Adjusting?

So, just how well is Canada's economy adjusting? Let me look at some of the important efforts we have made and at the policies that are necessary to help us manage change and seize new opportunities.

First, maintaining solid economic growth in Canada requires confidence based on well-managed monetary and fiscal policies. As you know, the Bank of Canada is responsible for monetary policy. You may also recall that in 1991, together with the federal government, we agreed on an anchor for monetary policy. This anchor was an explicit inflation target that would gradually lower the annual rate of consumer price increases to 2 per cent—the midpoint of a range of 1 to 3 per cent. Since then, we have kept inflation around 2 per cent, on average. And inflation expectations have fallen in line with this target.

Our inflation-targeting system means that the Bank of Canada lowers rates when we see the trend of inflation heading below 2 per cent. And it also means that we raise rates when it looks as if the trend of inflation will be moving above the target. This symmetric response helps to smooth the ups and downs of the business cycle. In our decision-making process, we must allow for the fact that it takes 18 to 24 months for changes in interest rates to have their full effect on the economy and on inflation. Therefore, we must constantly look ahead to make timely decisions that will help to smooth the business cycle, rather than exacerbate its volatility.

Another important benefit is that inflation targets have enabled the Bank to explain more clearly to business, labour, and the public what we are doing and why. Better public understanding of central bank policies and actions makes monetary policy more effective.

Canada's experience shows that monetary policy works best when it goes hand in hand with other sound economic policies. In particular, implementing and maintaining sound fiscal policy at all levels of government is fundamental to good economic performance. This gives a country the credibility and flexibility to manage economic challenges. And it gives citizens confidence that the authorities will manage public finances prudently.

I talked earlier about the impact of increased global competition. Canada has clearly felt that impact, and we continue to adjust to meet competitive pressures. Canada has a long history of supporting multilateral trade agreements. Opening up to global competition and to new markets has made us a more innovative and competitive economy.

As we see the integration of major new players in the world economy, our firms must continuously adapt, innovate, and improve their efficiency. That means continued investments in research and development, as well as education and training. And, in a changing world economy, our firms must continue to find and to exploit new opportunities.

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I noted earlier that the booming growth of large economies like China and India means that demand for both energy and non-energy commodities will likely remain strong. And so Canada will need the flexibility to shift resources into the production of those commodities, as demand requires. It is important that our resource sector strives to remain among the world's most efficient, and that our manufacturing sector continues to innovate.

The steps that I have just described will help us meet the long-term challenges that we, as well as other national economies, face. Canada's economy continues to adjust to global economic developments. Monetary policy has been facilitating these adjustments by supporting aggregate demand, with the goal of keeping the economy near its full production capacity and inflation on target.

Canadian Economic Outlook

Before I close, I want to spend a couple of minutes on the Bank's views about the current economic outlook and inflation in Canada. Growth in the first quarter of this year was 2.4 per cent, below the economy's estimated potential growth rate of about 3 per cent. This implies that the level of output in the economy is still

significantly below its production potential. However, both final domestic demand and exports grew strongly in the first quarter. These indicators, along with more recent data, suggest that growth in the first half of 2004 is likely to be somewhat above 3 per cent.

In our April *Monetary Policy Report*, we said that we expected the economy to grow by about 2 3/4 per cent in 2004 and by about 3 3/4 per cent in 2005. We also said that core inflation—a measure of trend inflation obtained by removing eight volatile components from the consumer price index, as well as the impact of changes in indirect taxes on the remaining components—was expected to average 1 1/2 per cent over the remainder of 2004 and to move back up to 2 per cent by the end of 2005. Information received since the release of our April *Report* has been generally consistent with expectations about core inflation.

But the sharp rise in world oil prices, in response to stronger-than-anticipated global demand for oil and heightened geopolitical uncertainties in the Middle East, means that total CPI inflation over the next several months will be higher than the Bank expected in April. It is important to note that while higher oil prices may push up the total CPI over the next few months, they should not feed through into higher trend inflation, as long as inflation expectations remain anchored around the 2 per cent target.

Conclusion

To conclude, the world economy has undergone tremendous change in recent years. And we can be sure that there is more to come.

While we Canadians can remain confident of our ability to adjust to change, we must not be complacent. We should continue to work at strengthening our macroeconomic framework, enhancing our productivity, and opening up further to trade.

While we Canadians can remain confident of our ability to adjust to change, we must not be complacent. We should continue to work at strengthening our macroeconomic framework, enhancing our productivity, and opening up further to trade. That is the best way to ready ourselves for the challenges and opportunities that lie ahead.

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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)
2000	J	1-3	3.0	1.2	5.50	6.00	5.73	-4.88	5.88	83.83	16.6	9.2	7.6	1.90	1.5	1.7	2.5	2.5	3.0
	A	1-3	2.5	1.2	5.50	6.00	5.75	-5.05	5.90	83.34	15.9	8.5	7.0	1.84	1.5	1.6	3.4	2.3	3.4
	S	1-3	2.7	1.0	5.50	6.00	5.74	-5.45	5.83	82.53	17.4	9.2	6.9	2.07	1.3	1.5	4.7	2.4	4.0
	O	1-3	2.8	1.3	5.50	6.00	5.75	-5.70	5.85	81.87	17.5	9.6	7.5	2.09	1.5	1.6	3.4	3.5	3.7
	N	1-3	3.2	1.5	5.50	6.00	5.75	-6.22	5.89	80.49	15.8	9.5	7.5	2.00	1.8	1.8	4.4	4.8	3.3
	D	1-3	3.2	1.8	5.50	6.00	5.80	-5.92	5.71	81.66	15.6	10.1	8.0	2.14	1.9	2.0	3.9	3.0	3.2
2001	J	1-3	3.0	1.8	5.25	5.75	5.49	-6.06	5.29	82.36	14.4	9.1	7.7	2.36	2.0	2.0	4.0	3.7	3.0
	F	1-3	2.9	1.7	5.25	5.75	5.49	-6.94	5.05	80.78	14.3	8.5	7.7	2.27	2.0	1.9	3.8	3.8	3.5
	M	1-3	2.5	1.8	4.75	5.25	4.99	-7.93	4.66	79.35	13.5	7.7	7.5	2.34	1.7	1.9	4.1	3.8	3.7
	A	1-3	3.6	2.3	4.50	5.00	4.74	-7.71	4.49	80.28	11.3	7.2	7.3	2.36	1.9	2.4	0.2	4.3	3.5
	M	1-3	3.9	2.3	4.25	4.75	4.67	-7.60	4.49	80.54	11.7	8.9	7.8	2.45	2.0	2.5	3.3	3.8	4.0
	J	1-3	3.3	2.3	4.25	4.75	4.49	-7.03	4.38	82.21	10.0	8.0	7.2	2.36	1.9	2.4	3.0	2.8	3.8
	J	1-3	2.6	2.4	4.00	4.50	4.24	-7.70	4.22	80.97	9.5	8.3	7.0	2.28	2.1	2.4	3.4	2.6	3.3
	A	1-3	2.8	2.3	3.75	4.25	4.17	-8.28	3.96	80.18	9.1	8.7	7.0	1.99	2.1	2.3	2.6	2.5	2.5
	S	1-3	2.6	2.3	3.25	3.75	3.49	-9.69	3.19	78.65	11.7	10.7	7.6	2.18	2.0	2.3	1.8	3.5	2.3
	O	1-3	1.9	2.2	2.50	3.00	2.74	-10.59	2.45	78.28	12.0	10.8	7.8	1.71	1.8	2.1	2.3	1.4	2.5
	N	1-3	0.7	1.7	2.00	2.50	2.60	-10.78	2.17	78.50	13.7	13.1	8.7	1.91	1.4	1.7	1.6	0.6	3.0
	D	1-3	0.7	1.6	2.00	2.50	2.24	-10.94	2.08	78.33	14.3	14.0	7.6	1.93	1.3	1.6	1.9	1.0	3.3
2002	J	1-3	1.3	1.8	1.75	2.25	1.99	-10.82	2.07	78.63	14.4	15.5	8.0	1.95	1.4	1.8	1.5	2.0	3.5
	F	1-3	1.5	2.2	1.75	2.25	1.99	-11.07	2.16	77.84	12.7	15.5	7.5	1.96	1.4	2.1	0.4	1.5	3.4
	M	1-3	1.8	2.1	1.75	2.25	1.99	-10.61	2.36	78.45	12.4	15.7	7.0	2.30	1.8	2.1	0.4	1.1	3.2
	A	1-3	1.7	2.2	2.00	2.50	2.24	-10.07	2.46	79.48	11.8	15.3	7.0	2.29	1.9	2.1	-0.2	0.6	2.8
	M	1-3	1.0	2.2	2.00	2.50	2.25	-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	2.50	-9.12	2.78	80.99	13.5	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	2.74	-10.40	2.88	77.71	13.8	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	2.74	-9.68	3.09	78.90	14.2	15.2	6.7	2.18	2.2	2.4	0.6	1.3	3.0
	S	1-3	2.3	2.5	2.50	3.00	2.74	-10.27	2.90	77.97	11.1	12.7	6.1	2.18	2.3	2.3	0.1	0.9	2.8
	O	1-3	3.2	2.5	2.50	3.00	2.74	-10.06	2.83	78.63	11.8	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	2.74	-10.21	2.85	78.24	9.8	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	2.74	-9.80	2.83	79.24	7.2	8.0	3.8	2.09	3.3	2.4	0.8	2.1	1.9
2003	J	1-3	4.5	3.3	2.50	3.00	2.74	-9.34	2.91	80.15	7.8	7.2	3.7	2.27	3.3	2.9	1.4	1.1	1.9
	F	1-3	4.6	3.1	2.50	3.00	2.75	-8.61	2.97	81.78	7.3	6.3	3.3	2.40	3.3	2.9	1.5	1.1	2.1
	M	1-3	4.3	2.9	2.75	3.25	2.99	-7.72	3.28	83.22	6.6	5.5	3.3	2.50	3.1	2.7	1.8	0.1	1.8
	A	1-3	3.0	2.1	3.00	3.50	3.24	-6.92	3.35	85.07	7.1	5.3	3.0	2.28	2.8	2.1	2.5	-1.5	1.3
	M	1-3	2.9	2.3	3.00	3.50	3.24	-6.02	3.27	87.60	7.7	5.5	3.5	2.12	2.5	2.2	1.5	-2.7	1.8
	J	1-3	2.6	2.1	3.00	3.50	3.24	-5.11	3.11	90.45	7.9	5.5	3.3	2.04	2.1	2.0	1.7	-3.7	1.4
	J	1-3	2.2	1.8	2.75	3.25	2.99	-6.60	2.89	87.07	10.0	6.7	3.6	2.25	1.7	1.9	2.1	-2.1	2.1
	A	1-3	2.0	1.5	2.75	3.25	3.00	-6.68	2.80	87.11	9.4	6.7	3.5	2.29	1.7	1.7	1.7	-2.6	2.1
	S	1-3	2.2	1.7	2.50	3.00	2.75	-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	2.75	-4.85	2.71	92.25	7.1	6.1	3.0	2.38	1.8	1.8	1.3	-5.5	2.7
	N	1-3	1.6	1.8	2.50	3.00	2.75	-4.73	2.73	92.54	8.6	6.7	3.1	2.38	1.8	1.7	0.5	-6.0	2.3
	D	1-3	2.0	2.2	2.50	3.00	2.75	-4.68	2.66	92.87	9.7	7.5	3.8	2.41	1.5	2.1	1.0	-5.4	2.7
2004	J	1-3	1.2	1.5	2.25	2.75	2.50	-5.77	2.37	90.68	10.7	8.3	3.8	2.66	1.5	1.5	0.9	-5.3	2.7
	F	1-3	0.7	1.1	2.25	2.75	2.50	-6.21	2.25	89.82	13.2	9.6	4.4	2.53	1.0	1.2	1.2	-4.4	2.8
	M	1-3	0.7	1.3	2.00	2.50	2.25	-5.72	2.10	91.55	14.2	10.4	4.7	2.65	1.1	1.2	0.3	-3.6	3.0
	A	1-3	1.6	1.8	1.75	2.25	2.00	-6.98	2.05	88.28	15.6	11.9	5.2	2.85	1.2	1.7		-1.6	3.2
	M	1-3	2.5	1.5	1.75	2.25	2.00	-7.08	2.07	87.98	16.4	13.1		3.00	1.2	1.8		2.3	3.0
	J				1.75	2.25	2.00	-6.36	2.10	89.81				2.96					

* 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)
	1991	2.7	4.9	2.9	8.6	7.6	1.0	3.5	2.0	8.2	0.8	-2.1		-1.8	10.3
	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	5.6	5.2	7.5	3.7	5.1	2.8		1.9	9.4
	1996	12.2	8.2	3.3	4.4	6.8	1.6	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	10.1	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	1.9	6.2	7.9	4.4	7.4	5.5	5.6	2.8	7.6
	2000	14.7	10.6	8.8	5.9	7.0	6.6	7.4	12.6	4.7	9.6	5.2	5.5	2.6	6.8
	2001	12.1	10.3	9.6	6.6	7.6	-1.3	5.7	6.9	4.1	2.9	1.8	2.0	1.1	7.2
	2002	12.0	10.9	13.7	7.4	6.4	-5.8	4.0	7.0	7.3	4.5	3.4	3.5	2.2	7.7
	2003	8.2	5.1	6.3	4.7	3.4	-3.2	1.8	8.8	8.1	5.3	2.0	1.8	2.2	7.6
Annual rates	2000 II	22.4	16.9	13.9	6.7	8.3	15.9	10.8	12.7	6.5	11.1	4.6	3.5	1.5	6.7
	III	11.6	8.4	6.4	5.0	6.8	3.1	5.5	11.3	2.1	8.4	5.1	4.5	1.4	6.9
	IV	9.1	9.8	7.6	3.4	7.0	7.1	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	4.3	3.0	4.7	1.4	1.5	0.3	7.0
	II	10.0	12.7	12.1	8.1	7.5	-15.0	2.9	5.0	3.9	0.8	0.9	1.5	0.9	7.1
	III	7.8	7.9	11.2	5.1	5.8	-4.1	5.4	7.2	6.5	-5.6	-0.6	-0.6	0.2	7.2
	IV	22.6	16.4	21.6	13.4	10.4	-1.1	5.5	5.4	7.0	-1.3	4.0	2.9	0.3	7.6
	2002 I	12.7	14.2	17.6	8.4	6.3	-10.2	4.4	5.0	7.0	8.8	5.5	6.3	2.7	7.9
	II	7.3	7.4	10.7	4.2	4.9	-5.3	3.0	9.0	8.8	12.0	3.8	4.8	4.1	7.6
	III	10.2	7.3	7.6	5.8	4.6	-3.1	2.7	9.9	8.2	5.4	4.2	3.1	3.9	7.5
	IV	8.2	5.3	5.3	4.1	3.2	-1.8	1.8	9.6	7.3	6.4	1.9	1.9	2.8	7.6
	2003 I	3.4	0.5	1.9	4.5	1.0	-0.8	1.8	7.0	7.6	9.6	2.8	1.7	1.8	7.5
	II	8.7	5.2	6.9	6.2	4.5	-1.2	0.8	8.1	8.1	-2.6	-0.7	-0.5	0.7	7.7
	III	17.2	11.5	12.8	5.0	5.4	-7.8	1.5	11.0	8.9	4.2	1.4	1.9	0.8	7.9
	IV	5.2	4.0	5.7	0.2	2.4	-11.6	2.3	8.6	9.6	4.8	3.3	3.8	3.6	7.5
	2004 I	20.4	11.1	12.4	5.5	5.0	-3.9	4.5	8.0	8.3	7.3	2.4	2.5	1.1	7.4
	II														
Last three months		22.4	16.5	19.3	6.4	6.3	5.2	4.9	7.1	8.4			2.9	0.7	7.2
Monthly rates	2003 J	1.7	1.1	1.2	0.4	0.4	-	0.3	0.8	0.5			-	0.3	7.7
	J	2.5	1.3	1.3	0.5	0.6	-0.8	0.1	1.4	0.8			0.5	-	7.7
	A	0.2	0.8	0.8	0.2	0.4	-0.9	0.1	0.3	0.7			-0.7	-0.1	8.0
	S	-0.1	-0.2	0.2	-	0.2	-1.5	-	0.7	0.8			1.1	0.3	7.9
	O	0.1	0.2	0.3	-0.3	-	-0.6	0.3	0.7	0.8			0.1	0.4	7.6
	N	1.2	0.7	0.8	0.2	0.5	-1.3	0.2	0.9	0.9			0.2	0.4	7.5
	D	1.0	0.3	0.5	0.5	0.1	-0.8	0.3	0.8	0.4			0.5	0.3	7.4
	2004 J	1.7	1.2	1.2	0.4	0.4	-0.1	0.5	0.8	0.8			-	0.1	7.4
	F	2.4	0.7	0.8	0.5	0.7	-0.2	0.2	0.3	0.7			-	-0.1	7.4
	M	1.1	1.5	1.9	0.4	0.4	0.7	0.4	0.5	0.5			0.9	-0.1	7.5
	A	1.9	1.4	1.6	0.9	0.9	0.6	0.4	1.0	1.0			0.1	0.3	7.3
	M	1.8	1.6	1.7			0.9	0.6						0.4	7.2
	J														

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)	
78.3	74.2	5.6	2.8	2.9		3.4	4.3	-11.2	-11.8	7.43	8.32	4.45	1991
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
83.3	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
84.4	85.9	1.7	1.4	1.7	0.1	1.9	2.7	6.7	1.5	4.85	6.18	4.01	1999
84.9	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
82.2	81.7	2.6	2.1	1.1	2.7	3.3	3.0	-5.2	-6.9	1.95	5.44	3.76	2001
82.3	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
82.0	83.0	2.8	2.2	3.2	1.5	2.9	1.5	20.1	8.8	2.57	4.66	2.79	2003
84.7	85.6	1.7	1.3	6.3	8.6	2.5	2.8	4.7	-4.9	5.53	5.93	3.77	2000 II
84.8	86.2	4.0	1.8	3.1	0.9	2.6	1.9	5.8	-17.6	5.56	5.75	3.60	III
84.9	86.3	4.2	2.5	3.1	2.7	3.0	2.3	17.0	-7.6	5.49	5.35	3.42	IV
83.5	83.5	1.0	1.5	3.0	3.9	3.9	2.5	11.6	-5.5	4.58	5.41	3.45	2001 I
83.3	82.9	5.2	3.2	-	1.2	3.1	3.0	-16.0	23.0	4.30	5.73	3.53	II
81.5	80.8	0.5	2.2	-5.1	2.7	3.7	3.2	-38.1	-22.2	3.05	5.32	3.68	III
80.4	79.6	-2.1	0.6	-4.8	-	3.0	2.4	-41.3	-30.8	1.95	5.44	3.76	IV
81.3	81.6	2.9	2.6	3.1	-0.8	3.1	2.1	15.9	12.3	2.30	5.79	3.68	2002 I
82.3	83.3	4.5	3.2	7.8	-0.2	2.7	2.1	40.0	-1.8	2.70	5.37	3.42	II
82.9	84.2	4.3	3.2	1.1	1.6	3.2	2.5	2.8	-1.5	2.83	4.92	3.25	III
82.6	83.9	3.7	2.1	4.5	3.3	3.3	3.5	20.4	-4.0	2.63	4.88	3.33	IV
82.7	83.7	4.8	3.8	6.8	1.6	2.9	2.4	82.0	14.1	3.14	5.13	3.08	2003 I
81.2	82.2	-1.6	-0.4	-1.8	1.2	3.1	0.8	-17.4	14.8	3.07	4.37	2.99	II
81.1	81.7	1.8	1.1	2.6	0.6	3.2	2.3	0.6	20.8	2.58	4.64	3.08	III
82.9	84.2	2.0	3.4	1.4	0.5	2.2	1.6	17.6	19.5	2.57	4.66	2.79	IV
83.5	84.9	1.3	1.0	4.7	1.0	2.8	2.7	45.3	38.9	1.98	4.33	2.39	2004 I
								36.7	34.4	2.01	4.83	2.37	II
		2.4	0.7		1.0			36.7	34.4	2.01	4.83	2.37	
		0.1	-0.1		-			3.2	2.6	3.07	4.37	2.99	2003 J
		0.2	-		0.1			-3.4	-0.2	2.81	4.78	3.15	J
		0.2	0.1		0.3			1.6	2.2	2.71	4.96	3.15	A
		0.2	0.4		-0.4			-1.8	3.6	2.58	4.64	3.08	S
		-0.1	0.2		0.2			1.1	-0.8	2.64	4.85	3.00	O
		0.3	0.3		-0.1			1.3	2.5	2.67	4.79	2.91	N
		0.3	0.2		0.4			8.5	1.7	2.57	4.66	2.79	D
		-	-		0.1			2.8	2.7	2.25	4.61	2.57	2004 J
		-0.1	-0.1		0.2			-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					3.2	3.4	1.95	4.71	2.46	A
		0.6	0.2					4.9	1.2	1.98	4.77	2.32	M
								-0.9	0.9	2.01	4.83	2.37	J

* 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)
	1991	-5.4	-8.4	1.0	-3.7	1.1458
	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
Annual rates	2000 II	1.1	3.1	6.0	2.4	1.4808
	III	2.3	3.3	6.3	2.9	1.4822
	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	0.8	0.8	5.6	3.0	1.3179
	II					1.3592
Last three months						1.3592
Monthly rates	2003 J					1.3523
	J					1.3815
	A					1.3957
	S					1.3632
	O					1.3218
	N					1.3126
	D					1.3128
	2004 J					1.2960
	F					1.3290
	M					1.3284
	A					1.3425
	M					1.3783
	J					1.3577

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 funding of the major money market dealers through general collateral buyback arrangements (repo) including special purchase and resale agreements with the Bank of Canada and funding through call loans and swapped foreign exchange funds. 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 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)