

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

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- *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

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).

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

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

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.

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.

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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,

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 government 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 per cent 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, Gadhoun 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.

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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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