



BANK OF CANADA

# Financial System Review

**December 2003**

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Ontario, Canada K1A 0G9  
Telephone: (613) 782-8248; e-mail: [publications@bankofcanada.ca](mailto:publications@bankofcanada.ca)

Please forward any comments on the *Financial System Review* to

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**D**evelopments

and

**T**rends

#### Notes

The material in this document is based on information available to 3 December unless otherwise indicated.

The phrase “major banks” in Canada refers to the six largest Canadian commercial banks by asset size: the Bank of Montreal, CIBC, National Bank, RBC Financial Group, Scotiabank, and TD Bank Financial Group.

## Introduction

*This section of the Financial System Review examines the recent performance of the Canadian financial system and the factors, both domestic and international, that are influencing it. In each issue, one or more subjects of particular interest are discussed as highlighted topics.*

### Key Points

- An improving economic environment and a stabilization in corporate credit quality have contributed to better results for financial institutions.
- The risks associated with the ability of Canadian households to meet their financial obligations under changing financial conditions appear to be within manageable levels.
- The financial system has experienced some significant changes in the prices of financial assets, but has responded in a resilient fashion.

A key development during the second half of 2003 is the substantial improvement in the global macrofinancial environment. The economic outlook for the industrialized economies, after deteriorating during the first half of the year, has been revised upwards since the summer. Financial institutions in the United States and Europe are reporting improved financial results. Nevertheless, risks associated with global imbalances remain, and in Canada the stronger dollar will affect the financial positions of those sectors with a strong net export orientation.

Stronger economic conditions have helped to stabilize the earlier decline in corporate credit quality, both globally and in Canada. Default rates and credit-rating downgrades on corporate debt have diminished. A declining need to add to loan-loss provisions contributed to the strong increase in profitability reported by Canadian banks in the second half of the year. Canadian banks have fared well over the current business cycle, compared with earlier cycles, attesting to their strong underlying position. Other financial institutions have also reported improved results.

In the face of past heightened losses on corporate lending exposures, the relative strength of the Canadian household sector has been a welcome source of support for the financial sector. An assessment of the potential impact of changes to the financial environment, such as higher interest rates or a fall in housing prices, on the ability of households to service their debt suggests that the risks in this area are within manageable levels.

In the context of an improving economic environment and an increase in investors' appetite for risk, there were some large movements in financial prices during recent quarters. Yields on long-term bonds fell to very low levels in June, before subsequently rising. Equity prices have risen steadily since the second quarter, as investors anticipate improved corporate earnings. Against the background of rapidly growing U.S. international indebtedness, global exchange rates have been dominated by a decline in the value of the U.S. dollar, such that the Canadian dollar has appreciated significantly. The Canadian financial system has adapted to these changing conditions in a resilient fashion.

International efforts to buttress investor confidence in capital markets, including revised standards for financial reporting and auditing, have continued. The importance of better oversight

and of high-quality financial reporting has recently been emphasized by the expanding investigation of trading practices in the U.S. mutual fund industry, which has revealed further issues related to market conduct.

## Highlighted Issues

Issues discussed in this section include the recent evolution of the financial position of the household sector and the financial performance of the Canadian banking sector over the current economic cycle.

### Financial position of the Canadian household sector

For the banking sector, the continued strength of returns on retail lending has been an important offset to the earlier deterioration in corporate credit quality and reduced investment banking activity.<sup>1</sup> In the following discussion, we focus on the evolution of household indebtedness and the potential impact on the household sector of changing financial conditions.

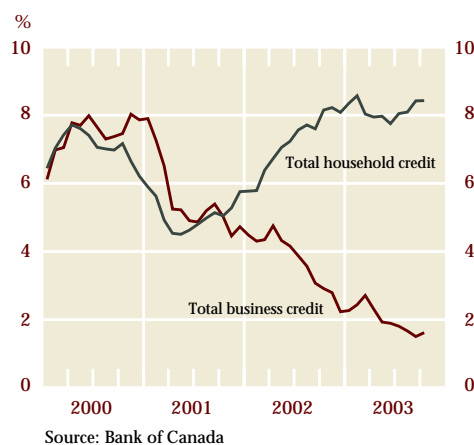
It is important to note that this analysis draws upon broad-based indicators of household financial conditions. While this provides useful information, varying conditions across different household income levels could also have important implications that are not captured in the discussion.

#### *Household credit*

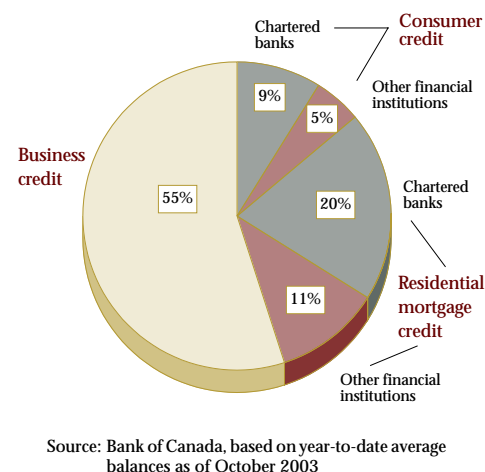
The growth of household credit has been persistently strong over recent years, in sharp contrast to the sustained slowing in business credit (Chart 1).<sup>2</sup> Household credit represents approximately one-half of the total loan exposure of financial institutions, much of it held by chartered banks (Chart 2). While the relative weakness in business credit primarily reflects reduced demand owing to economic conditions, losses on business loans have encouraged banks to place increased emphasis on the household sector, including retail lending and wealth-management activities.

**Chart 1 Household and Business Credit**

Year-over-year rate of growth

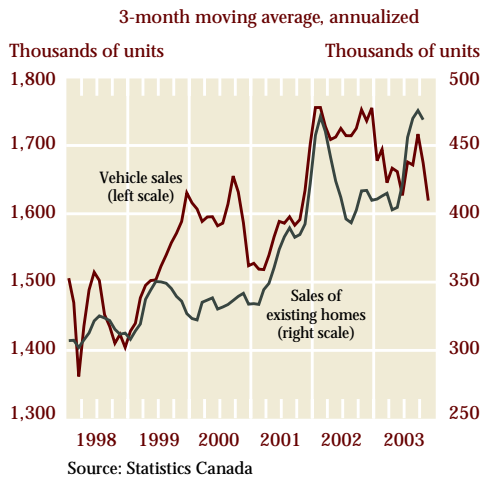


**Chart 2 Distribution of Lending by Financial Institutions, 2003**



1. For a discussion of the financial position of the Canadian corporate sector, see the "Highlighted Issues" section of the June 2003 *Financial System Review*.
2. The growth in credit to small businesses has been much better sustained, however, than that to large firms.



**Chart 3 Housing and Vehicle Sales**

The strength of household credit reflects the growth in both mortgage and consumer credit (the latter including vehicle loans, credit card loans, renovation loans, and lines of credit). This growth has, in turn, been stimulated by the strength of the domestic housing market and of auto sales, respectively (Chart 3). Although the growth of consumer debt has tended to outpace the accumulation of mortgage debt, mortgages still account for almost 70 per cent of total household debt.

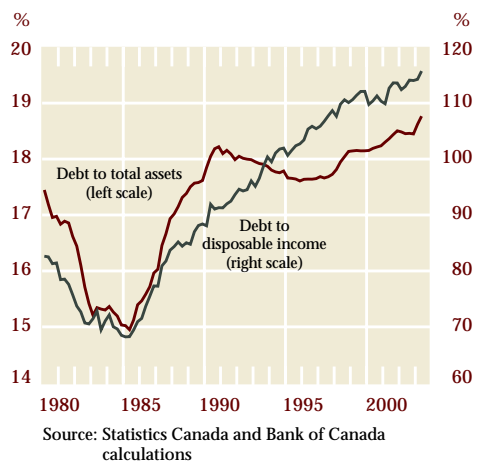
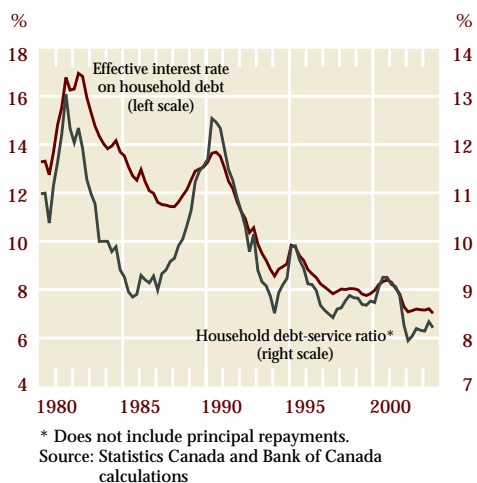
The expanded use of lines of credit, now held by just over one-half of Canadian households, has contributed to the overall growth in consumer credit. Amounts outstanding under credit cards have shown particularly strong growth. In addition, stimulated by strong house prices and low mortgage rates, a growing proportion of homeowners are refinancing their mortgages with a view to increasing the amount borrowed against their home equity. Based on recent survey evidence, the average size of the increase is about \$33,000.<sup>3</sup>

The securitization of household debt has been another significant trend in consumer debt since the mid-1990s. Securitization allows banks to restructure their exposure to these loans, effectively selling it in the form of bonds to a range of investors.

#### *Servicing household debt*

Consumer indebtedness, in Canada and elsewhere (e.g., the United States and the United Kingdom), has risen to high levels. A common measure of household indebtedness, the ratio of debt to personal disposable income, has risen steadily to about 115 per cent (Chart 4). In addition, households have a range of other financial obligations (e.g., payments on rental accommodation) that can affect their financial outlook. This has raised questions regarding the ability of households to service their debt and meet their financial obligations if circumstances change.

Several factors have likely contributed to this increased indebtedness. One is the higher level of household assets, which includes financial assets, real estate, and other real assets. The household debt-to-asset ratio has been relatively stable since 1990, exhibiting only a modest

**Chart 4 Household Debt Ratios****Chart 5 Household Sector Debt**

3. Clayton Research, drawing upon survey results from September 2002 to June 2003.

upward trend in recent years. Financial innovation and more efficient financial intermediation (between borrowers and lenders) have also facilitated credit growth.

More importantly, the cost of servicing debt has remained low throughout the current cycle, aided by the decline in consumer and mortgage interest rates (Chart 5). Mortgage debt remains the largest component of household debt, and mortgage interest payments relative to personal disposable income are at 20-year lows (Chart 6). Homeowners have increased principal payments relative to income in recent years, which has meant that interest and principal payments together have not declined in the same manner (relative to income).

Other indicators of the degree of financial stress affecting households also remain positive. For example, personal bankruptcies have been relatively stable since the early 1990s (Chart 7). Mortgage loans in arrears have declined in recent quarters. The pace at which delinquent credit card balances have been written off has remained relatively stable (at about 3 per cent in recent quarters), with the delinquency rate itself (balances more than 90 days in arrears) remaining well below earlier peaks (Chart 8).

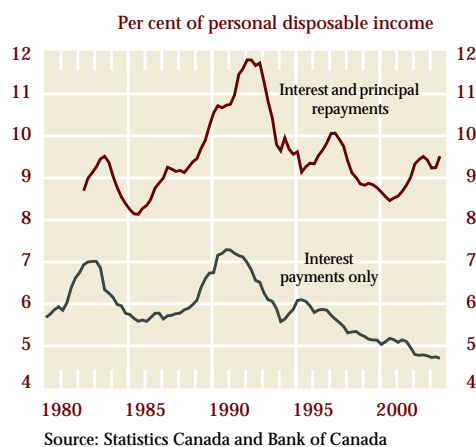
### Potential challenges

Despite this favourable performance, questions remain as to the impact that changing financial conditions might have. For example, given current levels of indebtedness, are households significantly vulnerable to an increase in debt-servicing costs should interest rates move higher? Additionally, given the importance of mortgage lending, are households vulnerable to a deterioration in the housing market and falling prices? In either case, if the ability of borrowers to service their debts was significantly compromised, the reduction in credit quality would adversely affect lending institutions.

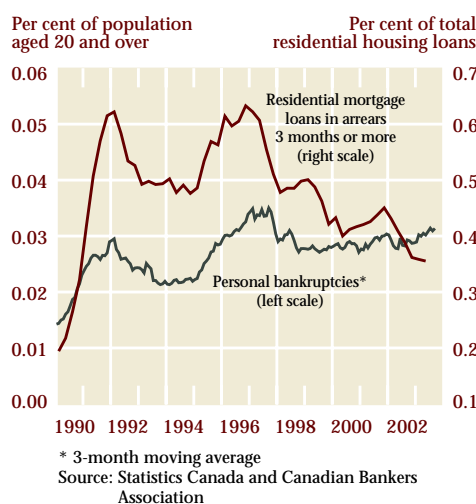
With respect to the first issue above, by making a number of illustrative assumptions, it is possible to estimate the level of the debt-service ratio for different interest rates. For example, suppose short-term interest rates were to rise from current levels (of 2.75 per cent) into the range of 4.5 to 6 per cent.<sup>4</sup> With attendant increases in rates for consumer and mortgage loans, then,

4. This represents a range around the average short-term rate for the last 10 years.

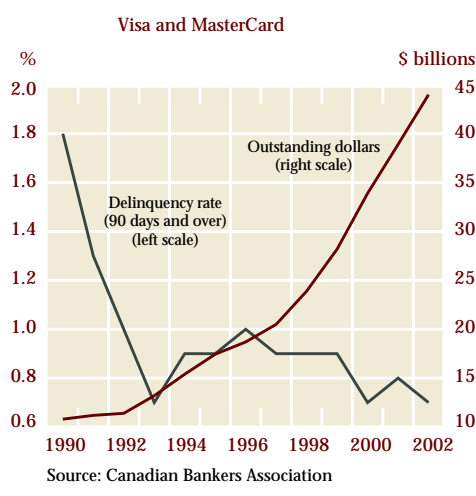
**Chart 6 Mortgage Payment Ratios**



**Chart 7 Financial Indicators**



**Chart 8 Credit Card Debt**



**Table 1**  
**Household Assets\***  
Per cent of total

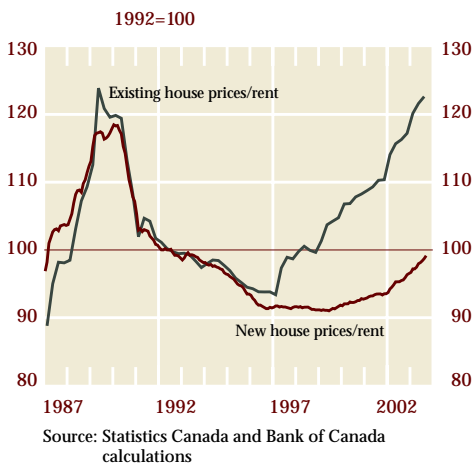
	Directly held	Mutual funds	Pension funds	Total
Real estate <sup>a</sup>	36	-	5	41
Equities	6	5	13	24
Bonds	3	2	8	13

\* In addition to the categories of assets identified here, household assets also include other real assets and deposits.  
Note: These data are based on the valuation methods as described in Statistics Canada's *A Guide to the Financial Flow and National Balance Sheet Accounts*. Cat. no. 13-585E, Occasional. Figures are Bank of Canada calculations.  
a. Real estate exposure through mutual funds is about 0.25 per cent. Pension funds hold a combination of residential and commercial real estate.

**Chart 9 Growth in Real House Prices\***



**Chart 10 Housing Price-to-Rent Ratios**



under some simplifying assumptions, the debt-service ratio would climb into the corresponding range of 8.5 to 10.5 per cent.<sup>5</sup> Even at these levels, however, the debt-service ratio would remain well below earlier peaks (recall Chart 5).

Other components of the financial portfolios of households are also directly affected by changes in interest rates. The prices of bonds, which make up about 13 per cent of household wealth (whether held directly or through mutual funds or pension funds), fall when interest rates rise (Table 1). However, the impact of even a substantial fall in bond prices on household wealth would be relatively small.

Real estate assets are a much more important component of household wealth.<sup>6</sup> With mortgage lending representing a substantial portion of the exposure of Canadian bank and non-bank financial institutions, a decline in house prices could adversely affect household credit quality.

Over the past several years, house prices in Canada have continued to increase at a reasonably moderate rate despite slower economic growth (Chart 9). In addition, the value of house prices compared with rental rates (the latter often proxied by the rented-accommodation component of the CPI) suggests that prices for existing homes have risen to relatively high levels (Chart 10). Nevertheless, the rate of increase in the prices of both new and existing homes has been much lower than was the case in the late 1980s. The price-to-rent ratio is also sensitive to the choice of proxy for the rental rate, suggesting that this indicator must be used with caution.<sup>7</sup>

- In practice, the higher debt-service ratio would not be reached immediately, since it would take time for existing loans to be affected. These figures incorporate assumptions about intermediation spreads, the yield curve, and mortgage refinancing. In addition, we assume an unchanged debt-to-income ratio.
- Not only are real estate assets a large proportion of wealth, but changes in housing wealth have a much larger estimated impact on consumer spending than equivalent changes in stock market wealth (see Pichette and Tremblay 2003).
- For example, adjusting the price-to-rent ratio by calculating the discounted value of expected future rental payments, and thereby reflecting the impact of low interest rates, would produce a lower path for this ratio. Note also that the series for prices of existing homes is not adjusted for quality, which may affect the results.

A key factor affecting the demand for housing, aside from demographic developments, is its current affordability. The average mortgage payment in Canada, whether measured in terms of absolute dollars or as a percentage of income, is at a relatively low level, particularly when compared with earlier peaks (recall Chart 6). One measure of housing affordability is per capita income relative to house prices (an increase in the index represents greater affordability). When prices of existing homes are used to construct the index, this measure shows that despite the increase in prices, affordability remains at a level that is near its average over the 1990s (Chart 11).<sup>8</sup>

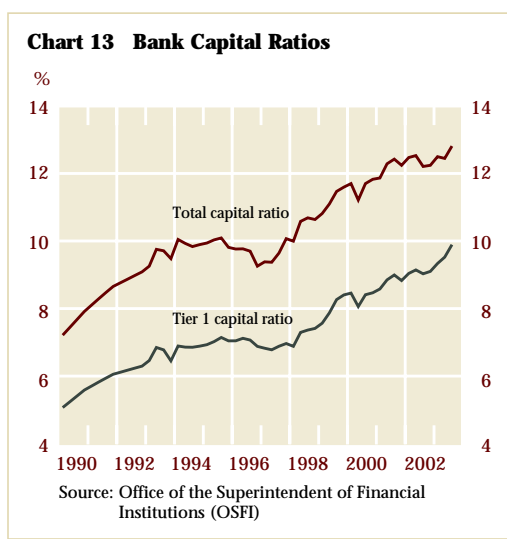
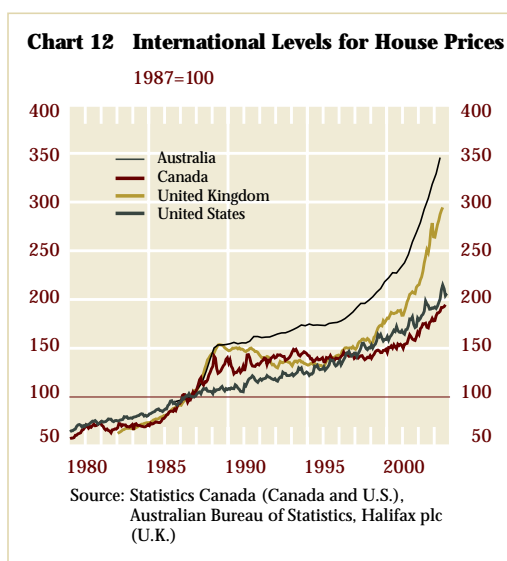
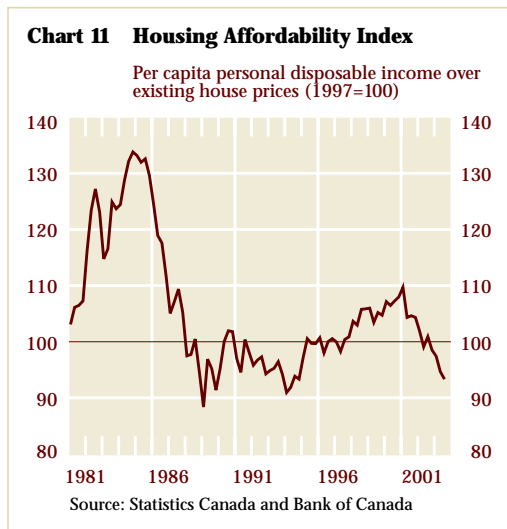
It is useful to place these developments in an international context. In a number of countries, such as the United States, the United Kingdom, Australia, Ireland, and several continental European countries, the pace of increase in housing prices has been similar or higher than in Canada. In a few countries (e.g., Australia and the United Kingdom), the rate of increase has raised concerns over a potential bubble in house prices that could lead to a significant retrenchment in prices (Chart 12).

In Canada, however, the pace of increase over the past several years has been substantially less than was experienced in the last half of the 1980s. In addition, the affordability of homes relative to income levels has declined only modestly, while low interest rates have, in turn, held mortgage payments at relatively low levels.

This evidence indicates that a significant retrenchment in house prices in Canada is an unlikely scenario going forward. Higher interest rates would indeed increase the carrying costs on both mortgage and consumer debt. However, debt-service ratios would rise only modestly from the current low levels. This suggests that the potential risks relating to household credit quality remain manageable.

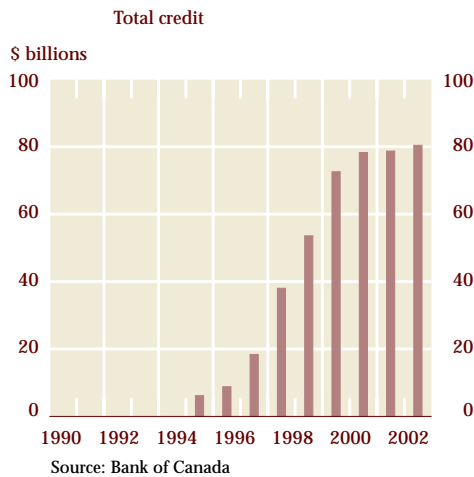
### Cyclical performance of the banking sector

The cyclical economic slowdown that occurred globally and in Canada during the past several years, together with the deterioration in corporate credit quality that accompanied it, has



8. An even more positive result would be obtained if the prices of new homes were used.

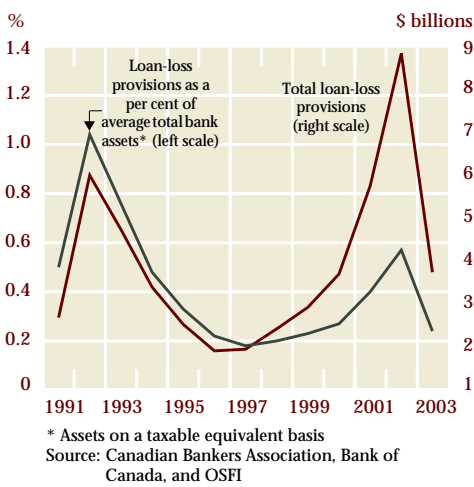
**Chart 14 Securitization by Financial Institutions**



affected Canadian financial institutions. How banks have performed in this environment, especially in relation to earlier cyclical episodes, provides insight into their underlying soundness.

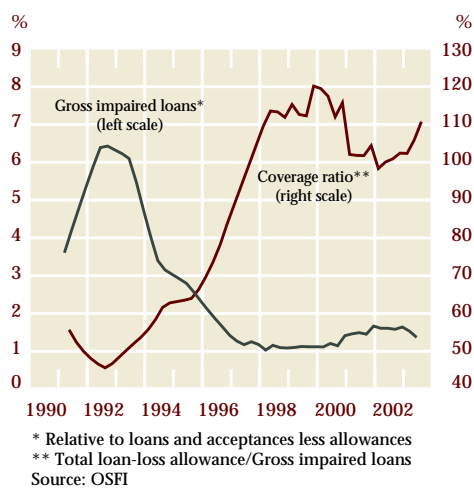
Comparisons with earlier periods should recognize the substantial amount of structural change that has occurred in the financial system. Supervisory changes have enhanced the overall robustness of financial institutions, encouraging, for example, higher levels of bank capital (Chart 13), and provisioning practices have been expanded with the increased use of general allowances.<sup>9</sup> Canadian banks have embraced new financial instruments, both to expand their revenue sources and to assist them in managing their risk exposures. Securitization of both consumer and business credit is one area in which Canadian banks have become active (Chart 14). Practices for managing financial risk have also evolved steadily (Box 1).

**Chart 15 Bank Loan-Loss Provisions**



Banks have also endeavoured to diversify their revenue sources and portfolios, both by product and, in some cases, by geographic area. For example, net interest earnings represent approximately one-half of revenue today versus 70 per cent in 1990–92. However, to the extent that product diversification introduced greater exposure to financial asset prices, it may also have introduced greater volatility into bank revenues. Institutional change has resulted in the major banks now accounting for two-thirds of the residential mortgage market, compared with 40 per cent 10 years ago (having absorbed a number of the other mortgage-lending institutions).

**Chart 16 Asset Quality: Major Canadian Banks**



In the context of the changes described above, Canadian banks have fared well in the recent more adverse environment. This is particularly apparent when comparisons are made with the previous economic cycle in the early 1990s. Despite the need to increase loan-loss provisions over the past several years, largely in response to the deterioration in corporate credit quality, provisions as a percentage of bank assets have remained much lower than in the early 1990s (Chart 15).

9. General allowances cover potential losses in a portfolio (perhaps for a particular industrial sector) where the losses cannot yet be identified with individual credits. These allowances may be in addition to provisions on specific loans.

**Box 1**

## Managing Market Risk

Among the approaches used by banks to help them assess market risk are two different, but complementary, techniques, known as value at risk (VaR) and stress tests.<sup>1</sup>

### Value at risk

VaR is a measure of the adverse impact that changes in interest rates and prices could have on the value of a bank's portfolio returns over one or more days. The probability distribution of these returns and their cross-correlations are assumed to be the same as those observed over recent history.

A threshold for the maximum expected portfolio loss can then be determined with a certain probability. For example, a 99 per cent confidence level suggests that the threshold would be exceeded on only one out of every 100 days.

The table below provides examples of the VaRs arising from different types of market risk for the trading portfolios of Canada's five largest banks in 2002. Note that some of these risks can offset each other (the diversification effect). Total market risk, whether measured over a one- or ten-day period (depending on the preference of the bank), is very small compared with the banks' Tier 1 capital bases.<sup>2</sup>

#### Value at Risk for the Average Trading Portfolio, 2002

99 per cent confidence level, Can\$ millions

Type of market risk	One-day VaR			Ten-day VaR	
	CIBC	RBC	TD	BNS	BMO
Interest rate	8.5	6.0	nr	23.5	22.3
Credit spread	5.8	nr	nr	nr	nr
Equity	8.3	8.0	nr	11.5	5.0
Foreign exchange	0.8	3.0	nr	5.4	3.5
Commodity	1.0	nr	nr	2.5	1.8
Diversification effect	(11.5)	(6.0)	nr	(17.9)	(3.9)
<b>Total</b>	<b>\$12.9</b>	<b>\$11.0</b>	<b>\$14.6</b>	<b>\$25.0</b>	<b>\$29.6</b>
% of Tier 1	0.12	0.07	0.15	0.15	0.26

nr = not reported

Source: 2002 annual reports of each institution

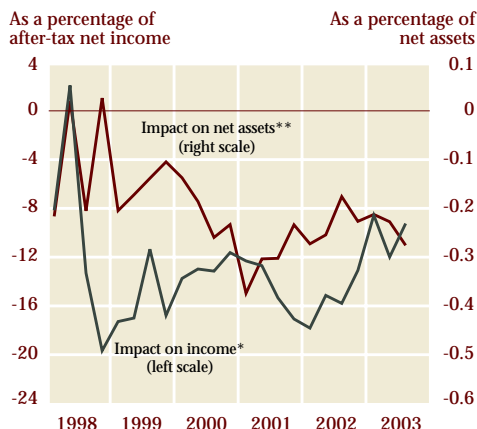
1. Market risk represents potential financial losses owing to the changing prices of financial assets. Credit risk is another important risk, involving the possibility that financial obligations (such as loan repayments) will not be met.
2. VaR results can change significantly from one day to the next. The maximum daily VaR is a measure of the upper bound of such variation. For example, the largest one-day total VaR for RBC in 2002 was \$18 million, and BMO's largest 10-day VaR was \$45.8 million (not shown). These maximums are also quite small compared with bank capital.

### Stress tests

During periods of market stress, actual returns and correlations may differ significantly from historical experience. In this case, VaRs would not be a useful reflection of risk. As a result, stress tests were designed to measure the risk arising from possible scenarios with unknown probabilities.

One such scenario regularly considered by banks is the impact of a hypothetical one-percentage-point shift in interest rates. The chart below illustrates the sum of the results for this scenario for the largest Canadian banks.<sup>3</sup>

#### Interest Rate Sensitivity: Major Banks

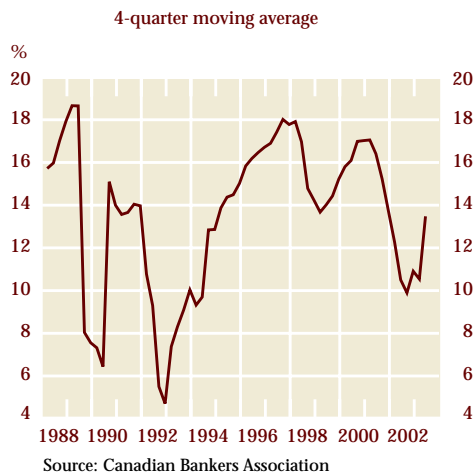
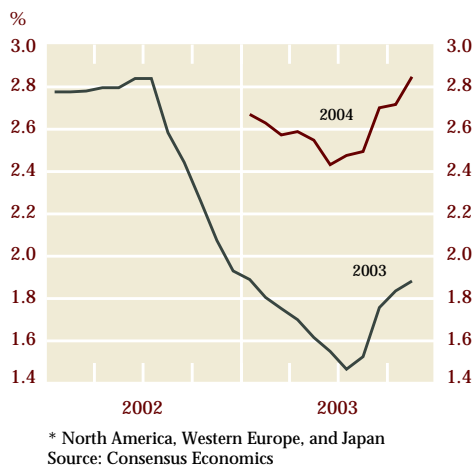
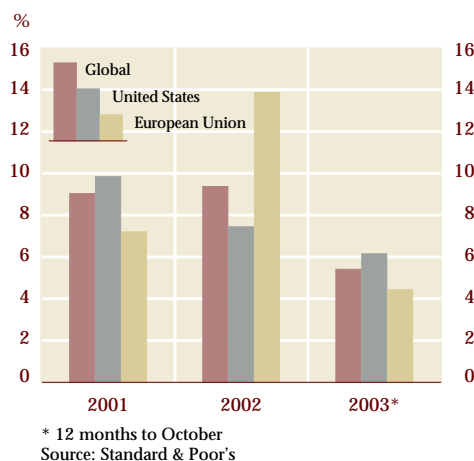


\* Impact on the consolidated after-tax net income from a 1 per cent increase or decrease in interest rates, whichever is greater

\*\* Impact on the consolidated economic value of net assets from a 1 per cent increase in interest rates

The green line shows the impact on bank income from a one-percentage-point change in interest rates sustained over a whole year (either an increase or decrease, depending on which has the more adverse effect at the time). The burgundy line shows the impact on net assets from a sustained one-percentage-point increase. As of the third quarter of 2003, such a shift in rates would have reduced annual after-tax net income by 10 per cent and the value of net assets by a rather small 0.28 per cent.

3. This and several other scenarios can be found in the annual reports of most banks.

**Chart 17 Return on Equity of Major Canadian Banks****Chart 18 Evolution of Consensus Estimates for Annual Growth: Industrialized Economies\*****Chart 19 Default Rates for Speculative-Grade Issuers**

The level of impaired loans has also stayed relatively low and, in turn, the coverage ratio (total loan-loss provisions relative to impaired loans) has remained over 100 per cent (Chart 16). This last outcome has been facilitated by the development of deeper secondary markets for loans, which banks have used to sell off portions of their loan books. In particular, several major Canadian banks have indicated their desire to reduce their exposures in certain areas, such as exposures to high-risk corporate and foreign loans, and to increase their focus on retail lending and wealth management.

The possibility has also been raised that the exposure of banks to certain sub-prime credits, such as credit cards, would contribute to larger losses. But the evidence suggests that the risks here have been well managed, with recent delinquency rates on credit cards below those of earlier periods (recall Chart 8).

In this context, bank profitability has remained strong, with profits declining only modestly before rebounding in recent quarters. Return on equity has fared relatively well compared with developments in the early 1990s (Chart 17). Overall, this suggests that the banking system has been able to address the challenges of the past several years from a fundamentally sound position.

## The Macrofinancial Environment

Global economic uncertainty has eased in recent months. While risks remain, the prospects for global recovery have brightened, led by a pickup in the United States and stronger-than-expected growth in Japan. This situation has favourable implications for financial stability.

### Global environment

Consensus projections for economic growth in 2003 and 2004 in the industrialized economies have been revised upwards in recent months (Chart 18). The improvement in economic conditions, combined with the ongoing efforts of firms to strengthen their balance sheets, has contributed to a reduction in financial stress. For example, global corporate default rates have fallen in recent months. The global default rate for speculative issuers, based on Standard & Poor's 12-month rolling average, fell to 5.4 per

cent at the end of October from 9.4 per cent at the end of last year (Chart 19). The global credit ratio for downgrades per upgrade fell to 2.0 in the third quarter, from 3.1 in the second, and 4.6 in the first, and the proportion of issues under review for possible downgrading declined.

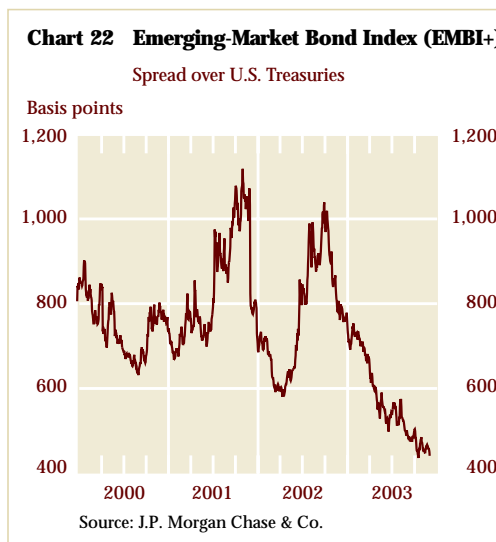
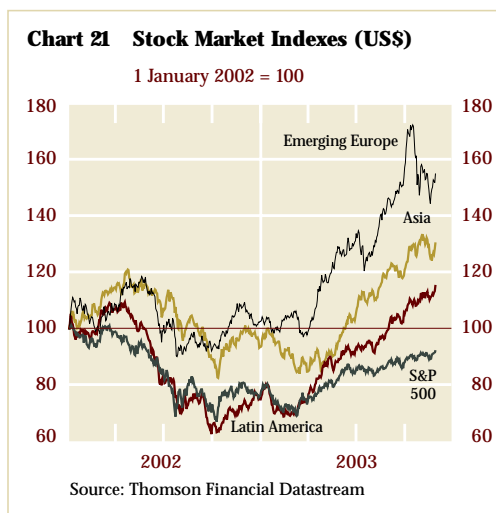
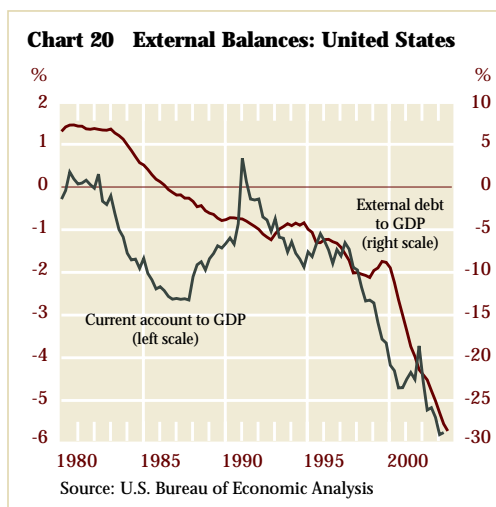
Globally, financial markets have improved significantly. Credit spreads have continued to narrow, and equity market prices have risen, supported by improved earnings prospects and an increase in the risk appetite of investors. Bond issuance by corporations has been robust.

Although a global economic recovery appears to be underway, risks associated with global imbalances remain. The configuration of growth in recent years has exacerbated external trade imbalances, since global growth has relied heavily on the United States (Chart 20). Government indebtedness has also worsened in a number of industrialized countries, a process that may not be sustainable, particularly in view of aging populations. Global rebalancing will likely involve a number of factors, including further structural reforms in some countries, additional adjustment in real exchange rates among currencies in industrial and emerging-market economies, and in some cases, fiscal consolidation.

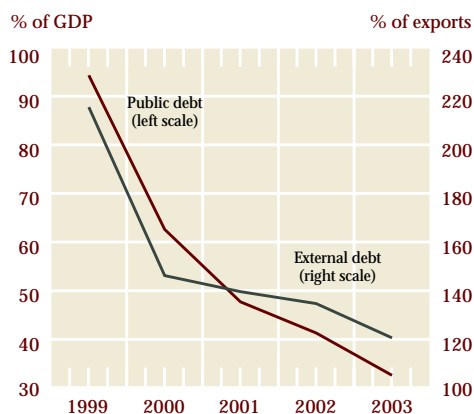
### Emerging markets

Equity markets in emerging economies, in both domestic-currency and U.S.-dollar terms, have risen strongly since March (Chart 21). Sovereign bond spreads continued to decline from peaks reached in October 2002 (Chart 22). A contributing factor may have been that low yields on industrial-country bonds have increased investor appetite for higher-yielding emerging-market debt.

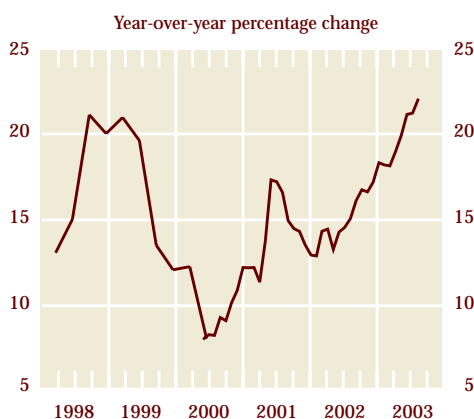
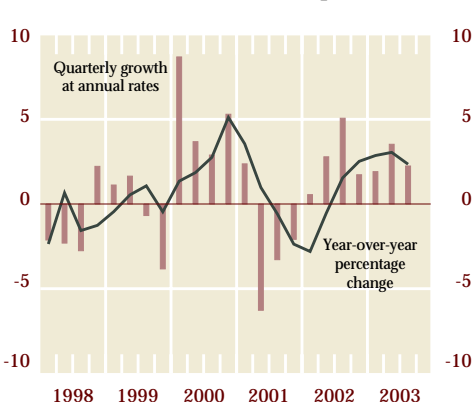
Contributing to the decline in bond spreads was Moody's decision on 8 October to upgrade Russia's external debt to investment grade. This reflected the government's commitment to prudent fiscal and debt-management policies (Chart 23), the creation of a macroeconomic stabilization fund (for use in the case of a downturn in commodity prices and government revenues), and lower political risk. However, recent concerns regarding investor rights under the Russian legal system have somewhat dampened enthusiasm for Russian assets.





**Chart 23 Debt: Russia**

Source: J.P. Morgan Chase &amp; Co.

**Chart 24 Domestic Credit Growth: China**Source: International Monetary Fund, *International Financial Statistics***Chart 25 Real GDP Growth: Japan**

Source: Thomson Financial Datastream

In China, real GDP is increasing at a very rapid rate, rising by 8.5 per cent in the first nine months of the year. This rise has been driven by strong investment in fixed assets and robust consumer demand. The strength in economic activity has coincided with a strong expansion in the money supply and in credit aggregates (Chart 24). Concerned over the inflationary risks of such a rapid expansion of credit, China's central bank raised the reserve requirements for banks in September and tightened lending standards.

Concerns have mounted with respect to the state of China's banking system. Although the expansion of lending has led, at least in the short term, to a decrease in the proportion of bad loans in the banking system, estimates of bad loans within mainland China's banking system remain very high.<sup>10</sup> This reflects many years of non-commercially based lending to state enterprises.

Efforts to strengthen China's banking system are underway. The four state banks (Box 2) plan to sell US\$6 billion in non-performing assets. A number of restructuring proposals are currently being considered, including an increase in the authorized limit to foreign ownership of Chinese banks, and a further liberalization of interest rates to better reflect credit risk. The authorities have also committed to liberalizing access by foreign banks to the Chinese market by 2006. The country's first bank-supervisory law could be adopted in the near future.

Argentina reached agreement with the IMF on a new economic program in September, which effectively rolled over existing Fund loans of US\$12.55 billion. After defaulting two years ago, Argentinian authorities have recently begun the process of restructuring their stock of non-performing loans from private creditors. They are aiming for a 75 per cent reduction in the nominal value (of about \$100 billion), although this is meeting with considerable resistance from bondholders.

### *Japan and Europe*

Economic activity in Japan has improved (Chart 25). Equity prices have increased by about 35 per cent from their lows at the end of April, which, in turn, has had a positive effect

10. Standard & Poor's, for example, estimates bad loans at 45 per cent of total loans.

**Box 2**

## The Structure of the Chinese Banking System

The Chinese banking system is dominated by the “big-four” state commercial banks (SCBs): the Industrial and Commercial Bank of China, the Agricultural Bank of China, the Bank of China, and the China Construction Bank. These banks have sectoral lending responsibilities, with the Bank of China being responsible for foreign exchange and trade finance. The bulk of their lending has been directed to state-owned enterprises. Together, the SCBs account for about two-thirds of the total assets of the country’s banking system. Four government-owned asset-management companies were established in 1999 to facilitate the resolution of bad debts at the large state banks.

China also has three policy banks: the State Development Bank, the Export-Import Bank of China, and the Agriculture Development Bank. Their principal role is to finance infrastructure and other long-term projects supported by the state. Their assets represent about 10 per cent of total banking assets.

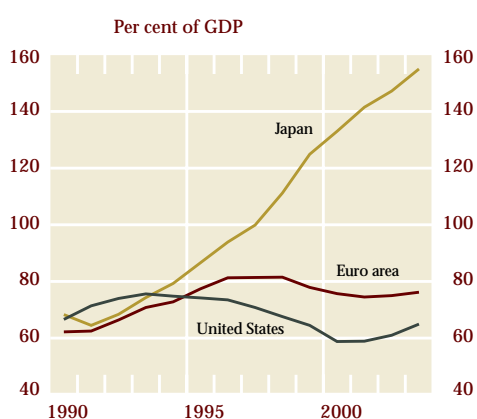
Ten joint-stock medium-sized commercial banks are also in operation. In most cases, these are owned by state enterprises or public sector entities. Four of these banks are listed on the domestic stock markets. In recent years, these institutions have expanded at a brisk pace through mergers with other banks and strategic alliances with foreign banks. The banking system also includes more than 100 city commercial banks, about

30,000 rural credit co-operatives, and a host of trade and investment corporations.

Participation by foreign banks is negligible because of the various restrictions they face in the conduct of their business. Foreign banks can engage in local-currency business only in specific geographic areas. They are not able to take retail deposits, and lending is subject to quantity restrictions. Foreign banks are, however, expected to play an increasing role in the Chinese financial system in the future, following China’s accession to the WTO. In 2004, foreign banks will be able to conduct unfettered domestic-currency business with Chinese enterprises, and geographic restrictions will be lifted. In 2007, they will be able to conduct local-currency business with Chinese individuals and will have full national treatment.

In recent years, foreign banks have tried to increase their penetration of the Chinese banking market. In December 2001, the HSBC and the International Finance Corporation (IFC), the private investment arm of the World Bank, bought, respectively, 8 and 5 per cent of the Bank of Shanghai, one of the largest city commercial banks. The IFC recently bought a 1.6 per cent stake in the Minsheng Bank, the only privately owned bank in China. China’s banking regulator will allow foreign banks to hold up to 25 per cent of a Chinese bank in the future, compared with the current limit of 15 per cent.

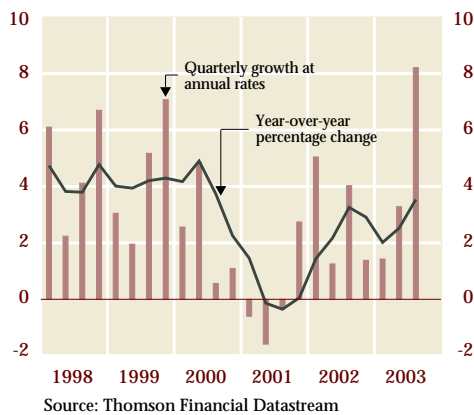
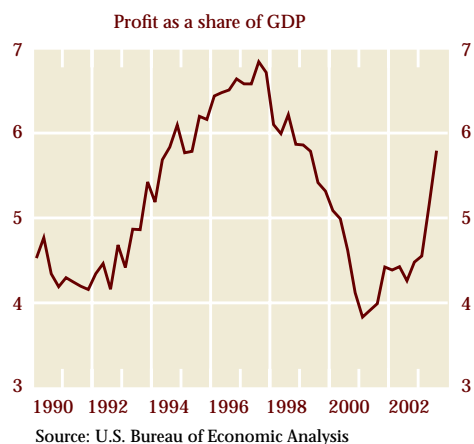
**Chart 26 Gross Financial Liabilities: General Government**



Source: Organisation for Economic Co-operation and Development

on bank profitability (since banks hold a large amount of shares in non-financial corporations). Corporate bankruptcies have generally declined, and credit downgrades in the third quarter were lower than a year ago. The situation remains difficult, however, with most observers expecting only modest growth over the medium term accompanied by persistent deflation. Government indebtedness is rising rapidly, a situation that does not appear sustainable over the longer term (Chart 26).

Efforts to revitalize the banking sector continue. Many of Japan’s largest banks have announced plans to improve internal efficiency and reduce their workforce. The Bank of Japan has also announced plans to extend its program of purchasing stocks from banks to help improve their balance sheets. At the end of September, however, the Industrial Revitalisation Corporation announced that its own appraisal of assets used as collateral by the six problem borrowers it has

**Chart 27 House Price Index: United Kingdom****Chart 28 Real GDP Growth: United States****Chart 29 Corporate Profit: United States**

agreed to support was lower than the assessment of the original lending banks. This may imply the need for further increases to loan-loss reserves. At the end of November, the government nationalized Ashikaga Bank.

Economic activity in Europe remains weak, with only limited growth in the euro zone in the last three quarters. This has contributed to ongoing pressure on the European corporate sector. Credit downgrades continued to outpace upgrades by a wide margin in the third quarter. Twenty-five per cent of the companies rated at the parent level in Europe were listed with a negative bias, a proportion similar to the situation last year. Owing to Germany's weak economy and the pressures on its banking sector, some corporations there are experiencing increased difficulty in obtaining bank loans.

In the United Kingdom, the rate of increase in housing prices continues to moderate (Chart 27). Nevertheless, concerns over a possible bubble in this sector remain (recall Chart 12). Since personal debt is at an elevated level, a significant decline in house prices could have an important adverse impact on the financial health of the household sector.

The European insurance sector has come under considerable pressure in recent years, owing partly to lower valuations for equity assets and higher insurance payments. This has been reflected in a series of credit-rating downgrades, with Standard & Poor's and Fitch recently downgrading the large German reinsurer Munich Re. The German government announced that it would provide support to domestic insurers by allowing them to deduct from taxes their losses on equities. More generally, insurance companies have moved to raise additional capital to buttress their financial positions.

#### *United States*

Economic activity in the United States strengthened considerably in the third quarter (Chart 28). Although some of this rebound may reflect temporary factors, such as a large contribution from recent tax relief, analysts have become more confident about the possibility of a sustained recovery. Corporate profits have risen significantly (Chart 29), and there is some evidence of a turnaround in employment.

U.S. corporations continue to improve their balance sheets. Total liabilities as a per cent of

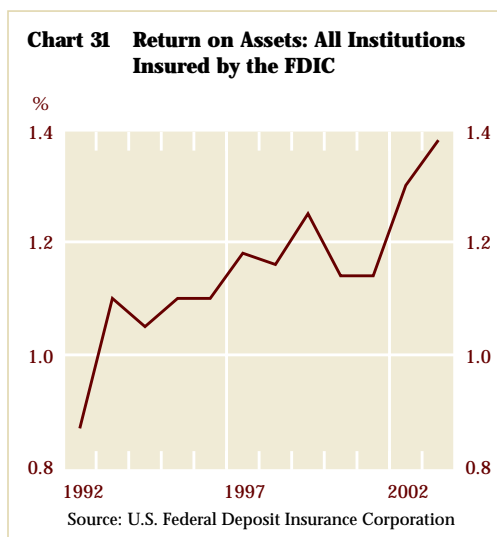
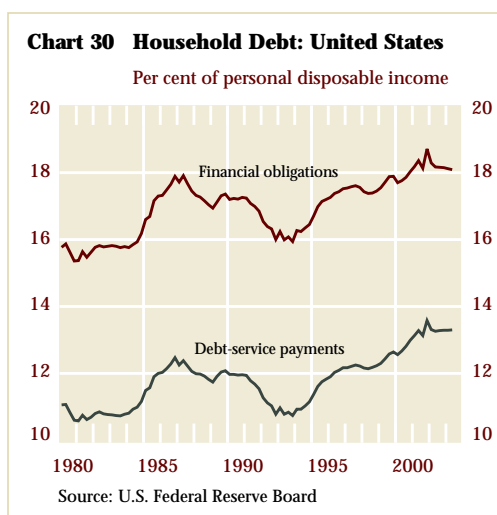
cash flow have declined recently, although the ratio remains elevated by historical standards.

In contrast, U.S. consumer indebtedness continues to increase, and debt-service ratios are high by historical standards. A recent study published by the U.S. Federal Reserve (Dyner, Johnson, and Pence 2003) examined a broad definition of household financial obligations (including other recurring financial expenses, such as rental payments). This measure shows that financial obligations, as a percentage of disposable income, are also at relatively high levels (Chart 30).

Owing to the beneficial effects of low interest rates and sustained demand for consumer loans, U.S. banks and savings institutions maintained record profitability in the third quarter. The industry's return on assets reached a record high of 1.4 per cent in the first half of the year (Chart 31). The third-quarter results were aided by continued improvement in credit quality, allowing banks to reduce new additions to loss provisions. Consolidation in the U.S. banking sector, after several years of reduced activity, took a large step forward in October when Bank of America announced its intention to merge with FleetBoston. The merged entity would become the second largest U.S. bank in terms of assets (Table 2).

U.S.-government-sponsored housing enterprises (GSEs), Fannie Mae (Federal National Mortgage Association) and Freddie Mac (Federal Home Loan Mortgage Corporation), are key participants in the U.S. market for mortgage-backed securities. Questions mounted last summer as to how they managed their interest rate exposure, and the magnitude of their potential vulnerability to volatility in bond yields through their hedging operations. In October, U.S. Treasury Secretary John Snow proposed the creation of a new Treasury-based regulator that would have increased oversight of the GSEs.<sup>11</sup>

The U.S. securities industry is also likely to earn record profits this year (Chart 32). The improvement relative to 2002 was initially narrowly



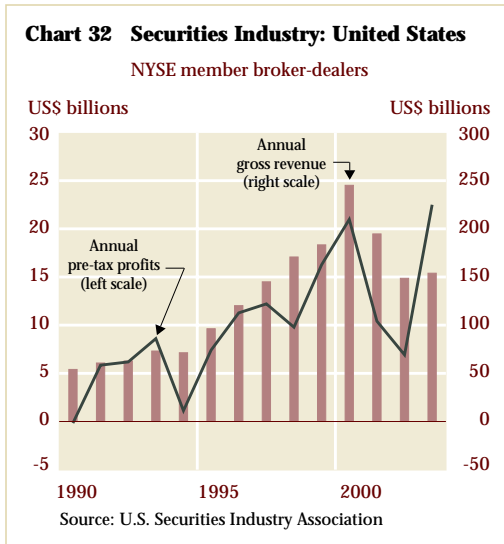
**Table 2**  
**Largest U.S. Banks (by assets)**

As of 31 December 2002

	\$billion
Citigroup	1,097
Bank of America/FleetBoston	851
J.P. Morgan Chase & Co.	759
Wells Fargo	349
Wachovia	341
Per cent of total bank assets	48

Source: U.S. Federal Deposit Insurance Corporation

11. In Canada, the federal housing agency, Canada Mortgage and Housing Corporation, operates differently. It does minimal direct mortgage funding and does not hold retail mortgages that carry an embedded prepayment option. Furthermore, oversight powers are provided to the Treasury Board through the Financial Administration Act.



based (particularly in bond trading and issuance), but in the third quarter there was evidence that revenue growth has broadened.

### *Corporate governance and financial oversight*

Efforts to increase investor confidence in financial reporting and auditing standards are being undertaken globally. In July, an international task force, commissioned by the International Federation of Accountants (IFAC) and chaired by John Crow, former Governor of the Bank of Canada, released its report, *Rebuilding Public Confidence in Financial Reporting: An International Perspective*. The report stresses that recent financial scandals are symptoms of deeper problems and proposes a range of actions to address low credibility in financial reporting.<sup>12</sup>

The International Accounting Standards Board (IASB) and U.S. Financial Accounting Standards Board (FASB) are spearheading efforts to bring about greater convergence in global accounting rules. The IASB met with U.S. and Canadian officials in October to review progress, but it is generally accepted that the process will take several years. The FASB will soon release proposed accounting changes that would bring U.S. rules more closely in line with international standards.

To promote confidence in global auditing standards, a new Public Interest Oversight Board will be established to monitor the international auditing standards established by the IFAC's International Auditing and Assurance Standards Board.

In the United States, hedge funds and mutual funds, both of which have become increasingly important investment vehicles, have come under increased scrutiny. A staff report from the Securities and Exchange Commission (SEC) recently recommended that hedge-fund managers be required to register with the SEC as investment advisers. The hedge funds would then have to provide information to the SEC that could be used to conduct audits.

12. Appendix 3 of the report contains a useful summary of the international initiatives that have been undertaken. A more recent summary of Canadian initiatives may be found in the article by Armstrong, page 53 of this *Review*.

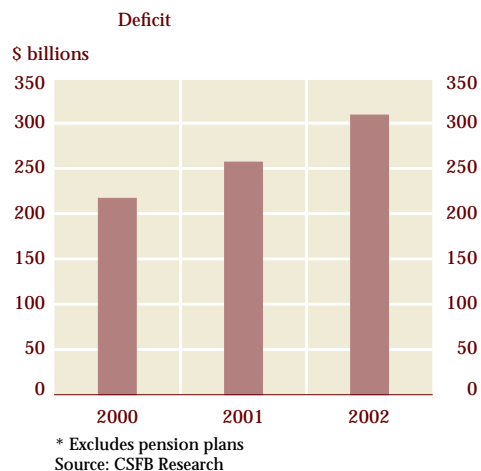
The U.S. mutual fund industry has also come under investigation as a result of questionable sales and trading practices. The investigations have led to a number of internal company audits to identify the scope of these activities, and some firms have set aside funds to cover the costs of litigation and potential investor restitution. In some cases, large investors have released specific mutual fund companies from their investment advisory roles, but the overall impact on investor confidence is not yet clear. There is a broadening array of proposals regarding improved oversight of the mutual fund industry.

*Post-retirement benefits*

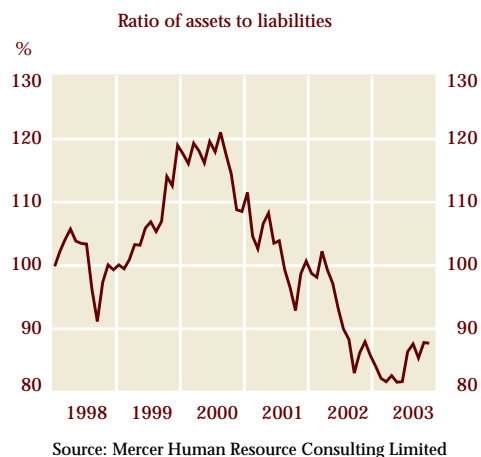
Corporations continue to face significant costs in meeting their obligations on long-term employee pension benefits. Weak equity prices reduced plan assets, while historically low interest rates increased the present value of liabilities (outweighing the positive impact from higher bond prices), leading to a sharp increase in the underfunding of plans. At the end of 2002, reported corporate funding shortfalls were about \$19 billion in Canada. As a result, firms faced higher contribution costs. More recently, there has been an increased focus on the cost to firms of other post-retirement employee benefits, especially health-care costs (Chart 33). Often, no specific assets have been set aside to fund these obligations.

Nevertheless, the rebound in equity prices from earlier low levels suggests that the financial positions of pension plans will improve. Similarly, higher interest rates would reduce plan liabilities (although this would be partly offset by reduced valuations for bond assets). In Canada, one indicator of the financial health of pensions (based on a model pension plan that is designed to reflect the behaviour of a standardized pension plan) shows some improvement from the lows reached earlier in the year (Chart 34). The U.S. Pension Benefit Guaranty Corporation estimates that total underfunding for U.S. firms will also decline somewhat in 2003 (Chart 35). Nevertheless, global authorities have come under pressure to monitor the health of pension plans more closely and, in some cases, to introduce changes to reduce the pressures on funding (Box 3).

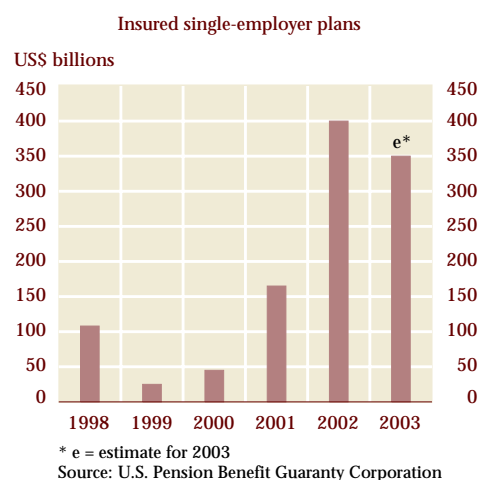
**Chart 33 Aggregate Funded Status for S&P 500 Companies: Other Retirement Benefits\***



**Chart 34 Mercer Pension Health Index: Canada**



**Chart 35 Pension Underfunding: United States**



## Box 3

## Government Initiatives Regarding Pension Funds: United States and Canada

U.S. legislative authorities are examining various proposals to reduce short-term funding burdens for U.S. corporations relating to their defined-benefit pension plans, with a view to introducing more substantive changes at a later date.

Currently, firms are required to use the 30-year government Treasury yield (adjusted upwards by 20 per cent) for discounting plan liabilities. To reduce the pension-funding costs of corporations, the Bush administration has suggested that pension liabilities be valued using a highly rated corporate yield curve, which would reduce the assessed value of liabilities. However, the proposal would also require firms with highly underfunded plans to immediately fund any increase to benefits or lump-sum payments. Elements of this plan are being considered by the U.S. Congress.

In early October, the House of Representatives proposed a temporary measure that, for two years, would allow firms to value pension liabilities using the yields on highly rated corporate bonds. The House resolution has yet to be debated by the U.S. Senate.

The U.S. Pension Benefit Guaranty Corporation has estimated that the House proposal would reduce corporate pension plan contributions by US\$26 billion over the next two years.<sup>1</sup> Alternatively, Credit Suisse First Boston has estimated that, depending on the final nature of the changes, companies in the S&P 500 index could save approximately US\$18 billion in pension contributions next year (see chart).

The Bush administration has also proposed that firms disclose more information about the funding status of their employee pension plans. In September, the U.S. Financial Accounting Standards Board issued a draft of proposed rules that would improve financial statement disclosures for defined-benefit plans. For example, it would require firms to report a breakdown of plan assets, covering items such as equity, debt, and real estate. In Canada, the Office of the Superintendent of Financial Institutions (OSFI) has recently announced several pension-related supervisory measures to better identify the risks faced by federally regulated pension plans, to promote better management of those risks, and to improve its readiness to deal with any problems. Among the initiatives underway to strengthen OSFI's supervisory

practices is the increased use of solvency testing on the pension plans it regulates in order to determine those warranting further watching.

The Accounting Standards Oversight Council recommended in July that the Accounting Standards Board (AcSB) explore ways of improving the disclosure of information on the performance of corporate pension plans in Canada. The Council's view is that various improvements to disclosure could benefit Canadian investors and other stakeholders. These improvements should include a better presentation of contributions and pension expenses, and information regarding a pension fund's asset mix and the assumed rate of return on different asset classes. In response, the AcSB has developed a new draft standard, which is expected to become effective in 2004.

The Canadian Association of Pension Supervisory Authorities (CAPSA) released draft governance guidelines in July designed to help pension plan administrators implement good governance practices. The CAPSA Pension Plan Governance Committee worked with an industry task force to develop the guidelines together with a Governance Self-Assessment Questionnaire. The guidelines and questionnaire are expected to be finalized after a testing exercise involving pension plan administrators.

### U.S. Pension Plan Contributions\*

S&P 500 companies with defined-benefit pension plans

US\$ billions



\* 2003 and 2004 are estimates  
Source: Credit Suisse First Boston

1. See the 14 October testimony of Steven A. Kandarian, executive director of the Pension Benefit Guaranty Corporation, before the Special Committee on Aging of the United States Senate.

## Canadian developments

Domestic factors that influence developments in the Canadian financial system include the state of the Canadian economy, the financial position of the household and corporate sectors, and developments within specific industrial sectors.

### *Canadian economy*

Aggregate output in Canada changed little from the first to the third quarter of 2003 (Chart 36). An important factor behind the weakness of aggregate activity during this period was a sharp drop in inventory investment. A number of unusual shocks (e.g., SARS, BSE, and the Ontario electricity blackout in August) also helped to further dampen economic activity.

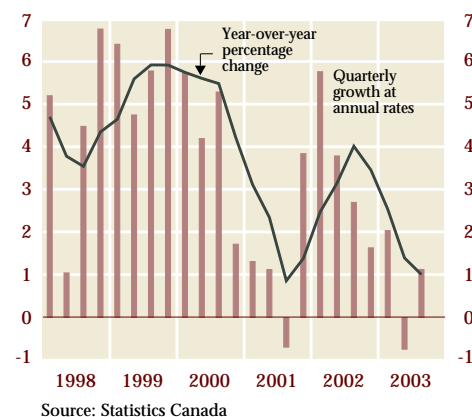
There are, however, several encouraging developments that support the view that growth in the Canadian economy will strengthen in 2004. Growth in final domestic demand has remained robust, and the adverse effects of some of the recent unusual shocks are starting to dissipate. However, the boost to Canadian exports from the further anticipated improvement in global economic conditions will be dampened by the rise in the Canadian dollar over the past year.

### *Household and corporate sectors*

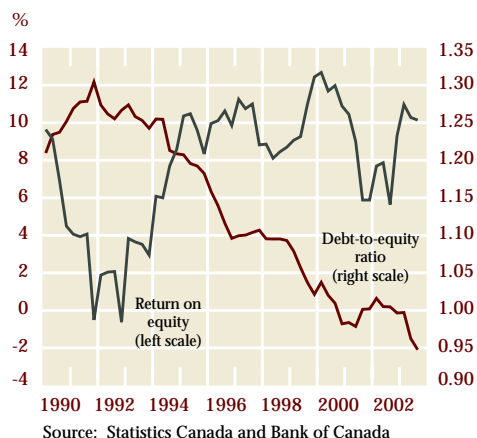
The financial situation of households remains healthy. Rising debt levels are being supported by low debt-service costs and ongoing growth in assets and incomes.<sup>13</sup> Consumer confidence continues at a high level.

The financial position of the non-financial sector continued to improve in the first three quarters of 2003. The aggregate debt-to-equity ratio fell further, reaching a very low level (Chart 37). The return on equity is very strong, although having eased somewhat from earlier record levels as a result of reduced prices for energy commodities and the impact of the stronger Canadian dollar. Indeed, the confidence of both small and large firms improved in the third quarter of 2003, given an increasingly shared view that near-term economic conditions would improve (Chart 38). Corporate credit quality showed further improvement in

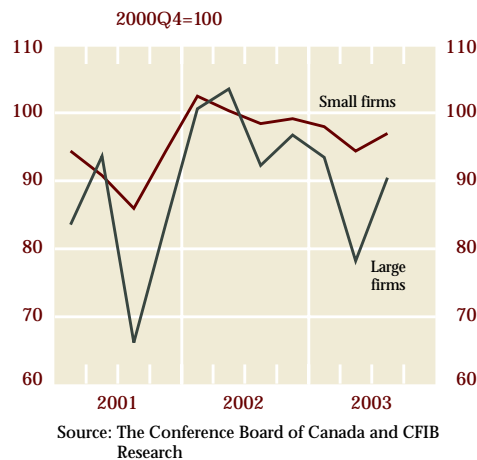
**Chart 36 Real GDP Growth: Canada**



**Chart 37 Canadian Corporate Sector: Return on Equity and Debt-to-Equity Ratio**

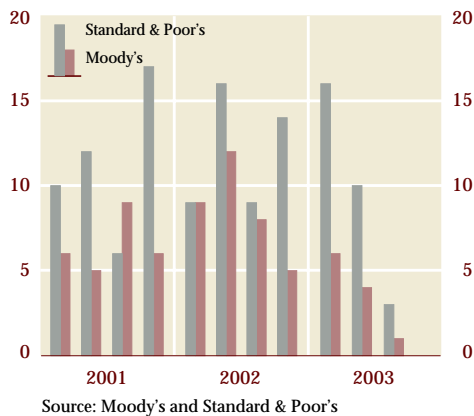


**Chart 38 Canadian Business Confidence**



13. For further discussion of the financial position of the Canadian household sector, see Highlighted Issues, on page 4.



**Chart 39 Credit-Rating Downgrades: Canada**

the third quarter, as the number of companies downgraded continued to decline, with few defaults recorded to date in 2003 (Chart 39).

### Industry

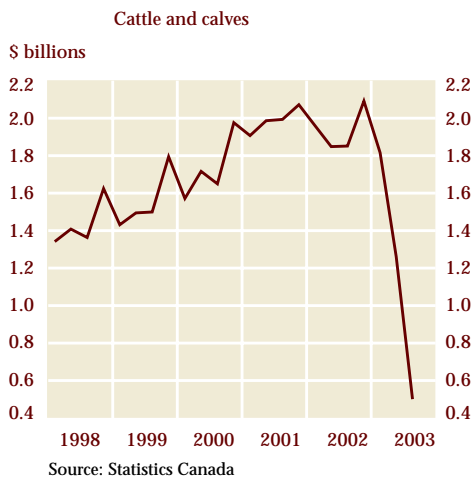
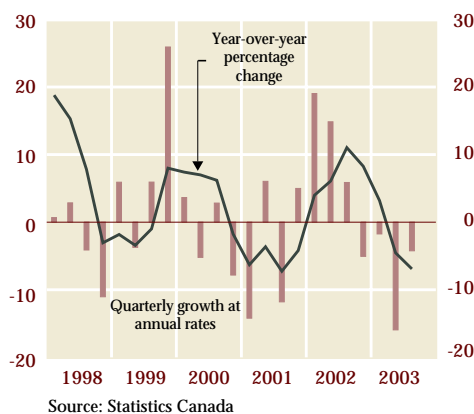
Although the financial condition of the overall non-financial corporate sector is relatively healthy, some industries continue to be under financial stress. Activity levels and profitability in the airline and aerospace manufacturing industries fell sharply in the second quarter from already-low levels, mainly owing to the adverse economic effects of the SARS outbreak. As a result, some firms in these industries are restructuring their operations and balance sheets. More recently, there has been a partial recovery of activity in the airline industry.

The financial situation in Canada's livestock sector has also deteriorated, following the appearance of one case of BSE in Alberta (Chart 40). However, a number of countries have partially lifted the ban on Canadian beef products since early August.

The financial positions of many of those sectors with a strong net export orientation continue to be adversely affected by the appreciation of the Canadian dollar. In particular, the rise in the value of the Canadian dollar is likely to have an especially significant negative impact on the profitability of high-tech manufacturing industries. Indeed, profitability in the electronic and computer manufacturing industry deteriorated in the third quarter of 2003, with manufacturers of telecommunications equipment still facing weak demand.

As well, steel manufacturers have seen their financial positions worsen considerably (Chart 41), given weak demand and prices, the strong dollar, and high costs for raw materials and energy. While producers of non-ferrous metals and forest products would typically benefit from the marked increase in global prices for both non-ferrous metals and lumber, a major offsetting factor has been the appreciation of the Canadian dollar.

The near-term financial prospects of North American automakers remain weak owing to global excess capacity, the high cost of sales incentives, and the need to shore up their pension plans. Credit ratings have come under downward pressure.<sup>14</sup>

**Chart 40 Farm Cash Receipts****Chart 41 Real Output Growth: Steel**

14. In recent months, the credit ratings of Ford and DaimlerChrysler have been downgraded.

## The Financial System

The recent improvement in the global macrofinancial environment follows a period during which the Canadian financial system faced a weaker domestic economy and a number of external shocks. This was reflected in past heightened levels of uncertainty, increased risk aversion by investors, and a deterioration in corporate credit quality.

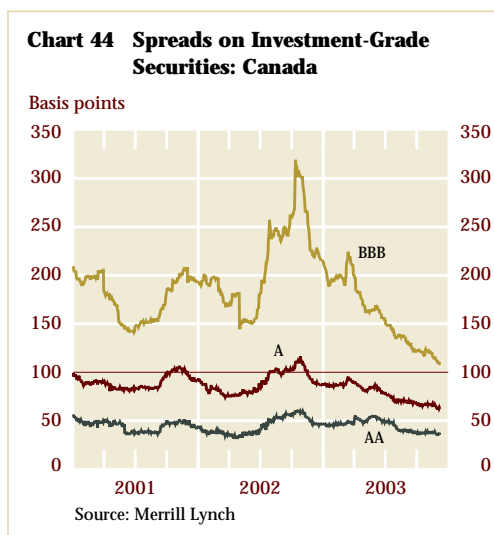
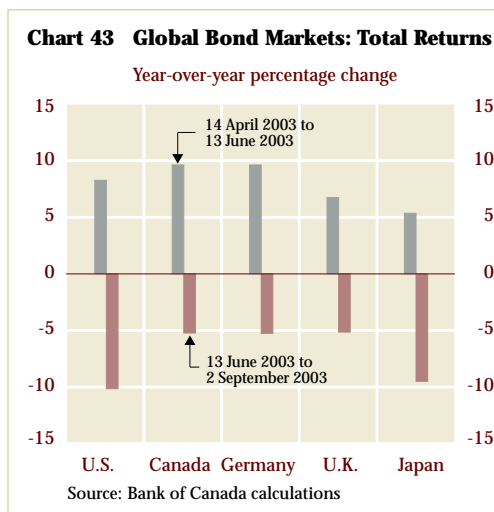
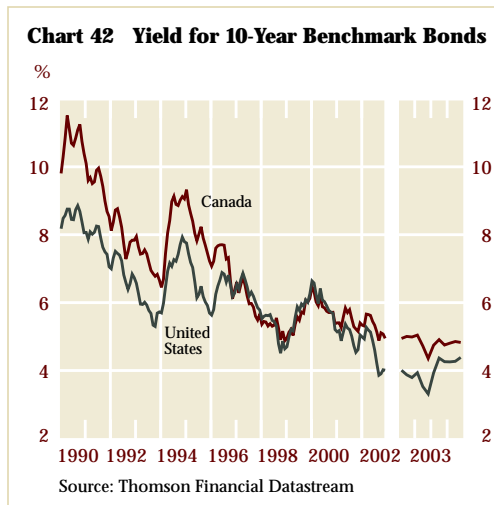
The reaction of the financial system over the last couple of years points to its underlying resiliency in the face of these challenges. Indicators designed to measure the contemporaneous degree of stress reinforce the view that these adverse events did not produce a high degree of stress in the financial system (Box 4). Other recent indicators, discussed below, point to a favourable performance in the second half of this year.

### Financial markets

Recent quarters have seen some substantial movements in the prices of financial assets and in currency valuations. Bond yields experienced substantial volatility during the summer and into early autumn. In addition, the Canadian dollar and other currencies resumed their upward path against the U.S. dollar after a brief pause during the summer.

#### *Fixed-income credit markets*

Government bond yields in Canada and the United States have been particularly volatile in recent months, moving higher after reaching historic lows in mid-June (Chart 42). The sharp movements created substantial gains and losses for bondholders over relatively short periods (Chart 43). While the rise in yields broadly reflected growing optimism about the prospects for global economic growth, other factors also helped to reverse the earlier decline. The 25 June policy decision of the U.S. monetary authorities and the accompanying communications marked an important turning point, with the Federal Reserve's more optimistic economic outlook for the U.S. economy ultimately shared by many market participants. Technical factors also played a role, as hedging in the mortgage market amplified movements in yields in both directions (Box 5). In addition, the expected increase in U.S. government budget deficits and,



## Box 4

## Measuring Stress in the Financial System

Financial stress is the force exerted on economic agents by uncertainty and by changing expectations of loss in financial markets and institutions. Extreme levels of stress are sometimes referred to as crises.

The financial stress index (FSI) is one way of ranking how much stress the financial system is under at a given point in time (see chart). It is not a leading indicator of stress.

This box describes how to interpret the FSI. Details about the components and construction of the index are discussed in the report entitled “Measuring Financial Stress” on page 43 of this *Review*.

### Interpreting the FSI

The FSI is an ordinal ranking of stress in the financial system expressed as a percentile. For example, a value of 75 indicates that the level of stress is greater than it was on 3 out of every 4 days since the beginning of 1980. However, a change in the level of the index does not imply a one-for-one change in the actual amount of stress. The FSI was designed to focus on periods of elevated stress, reflecting the fact that stressful periods are episodic rather than a normal cyclical feature of the financial system.

### Periods of elevated stress

The FSI reached its highest levels, indicated by the 99th percentile of the overall distribution, during the recessions of the early 1980s and the early 1990s, owing to the conjunction of high interest rates, bankruptcies, bond defaults, and bank loan losses. The FSI also peaked briefly as a result of the market turmoil surrounding the problems with the European exchange rate mechanism (ERM) in 1992. The most dramatic increase in the FSI occurred just after Russia’s debt default in 1998, which precipitated a major shift in global demand away from risky assets.<sup>1</sup>

Other notable periods of elevated stress include 1985–86, when several small Canadian banks failed or underwent distressed mergers, the 1987 stock market crash, and the aftermath of the 11 September terrorist attacks.

### Periods of calm

The threshold between relative calm and elevated stress is subjective. However, below the 75th percentile, few of the peaks in the FSI can be associated with significant financial events.

### Recent movements in the FSI

Recently, the FSI has dipped into the bottom quartile of the historical distribution. This reflects the fact that the financial system has responded resiliently to recent shocks, including sharp movements in bond yields and elevated exchange rate volatility.

Indeed, the financial system’s capacity to absorb shocks over the past several years, such as the collapse in high-tech share prices and record global corporate bond defaults, appears to be much greater than during previous economic and credit cycles.

### Using the FSI

The financial stress index complements the many other tools that the Bank of Canada uses to assess whether financial conditions are improving or deteriorating. The specific level of the index has no direct implications for policy, and in no sense should the index be seen as a target.



1. For a more detailed discussion of notable episodes of financial stress, see Chant et al. (2003, 61–89).

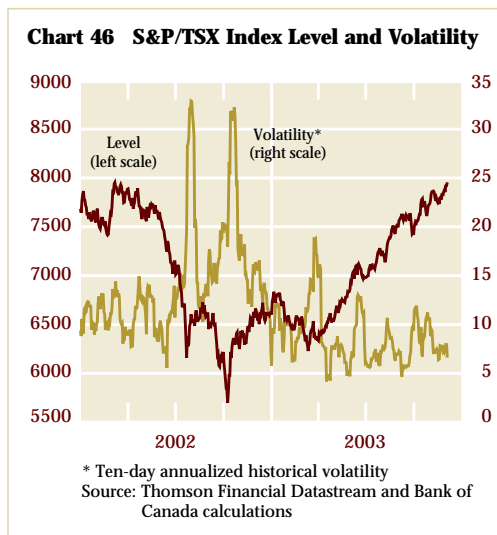
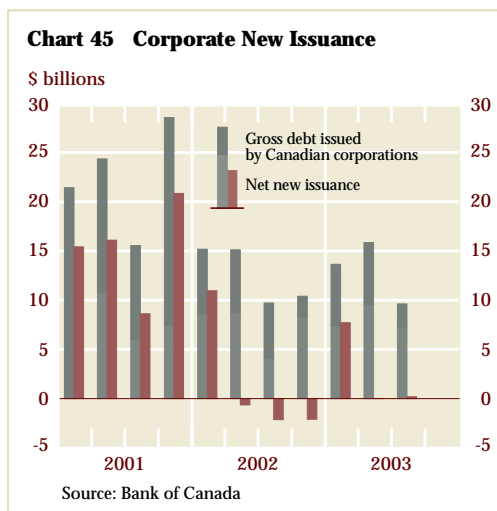
hence, the supply of U.S. Treasuries placed upward pressure on yields.

Yield spreads between corporate and government debt have continued to fall in the second half of the year (Chart 44), as investors have demonstrated a greater willingness to bear credit risk. After a brief seasonal lull in borrowing activity during July and August, gross corporate bond issuance has picked up. Over the course of the year, issuance of Canadian-dollar bonds has remained relatively strong compared with that of U.S.-dollar bonds (Chart 45). Net issuance has been subdued, however, as firms access alternative sources of financing and continue to improve their balance sheets.

### Equity markets

North American equity markets have strengthened steadily over the course of 2003. Technology has been the strongest sector, while international indexes have also appreciated substantially. This appreciation has occurred in an environment of relatively low volatility, with volatility measures remaining below their longer-term averages (Chart 46).

Corporate earnings continue to support equity markets. Approximately two-thirds of U.S. firms in the S&P 500 exceeded consensus expectations for earnings in both the second and the third quarters. Profits for firms listed on the TSX increased strongly in the third quarter.

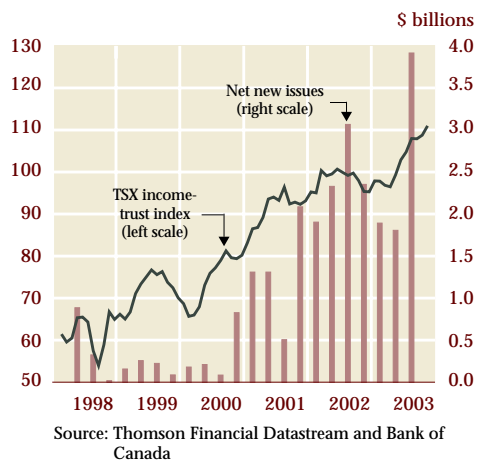


### Box 5

## Dynamic Hedging Strategies

Portfolios containing mortgages and mortgage-backed securities (MBS) must be frequently rebalanced because almost all mortgages written in the United States allow the payer the right to fully prepay the mortgage without penalty. This is analogous to the payer owning (being long) a call option on mortgage rates. If the payer is long on this option, then by definition, the mortgagee (or the holder of the MBS if the loan is securitized) is short the call option. Investors may wish to hedge this short position, otherwise their portfolios would be exposed to large and unpredictable shifts in duration. Thus, investors may undertake dynamic hedging. This entails holding a long position in an underlying security (typically a Treasury bond or interest rate swap) that

offsets the sensitivity of the option to changes in the underlying interest rate (the *delta* of the option). This is known as *delta hedging*. Delta, however, changes as the underlying level of interest rates changes. As a result, the portfolio is properly hedged for only a short period of time and must be frequently rebalanced. This rebalancing entails increasing exposure as yields fall (having to buy bonds when their price rises), or decreasing exposure as yields rise (having to sell bonds when their prices fall). Since the rebalancing transactions involve purchases when prices are rising and sales when prices are falling, they have the potential to exacerbate sharp price changes in either direction.

**Chart 47 Income Trusts**

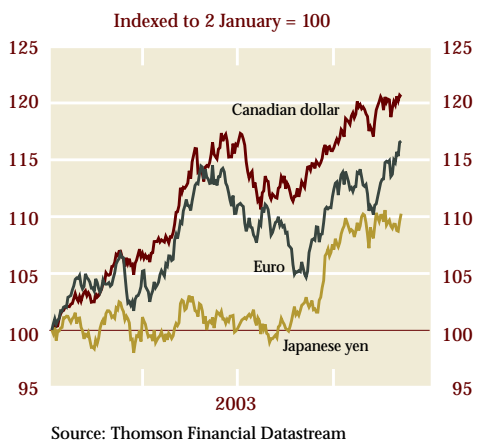
The continued strong performance of equity markets has raised some concerns about valuation levels. While estimated forward price-earnings ratios for the TSX and the S&P 500 have risen in recent months, they remain at levels close to their long-run averages. Price-earnings ratios for the technology sector, however, are substantially higher, presenting the possibility of a correction.

Despite some concerns about valuations, and in certain cases reductions in distributions, the income-trust market in Canada has continued to expand (Chart 47), supported by increased interest from U.S. investors. The market has become an important source of financing for Canadian businesses.<sup>15</sup> Securities regulators have put forward proposals, however, to improve the disclosure related to new trust offerings.

#### *Foreign exchange markets*

A dominant feature in foreign exchange markets has been the broadly based weakening of the U.S. dollar (Chart 48). The decline in the value of the U.S. dollar since the summer has coincided with a shift in market focus away from U.S. economic recovery and towards concerns over the sustainability of global economic imbalances, including the U.S. current account deficit (especially in an environment of increased government borrowing). The Canadian dollar was supported by other factors as well, such as firm commodity prices and the smaller amount of excess capacity in the Canadian economy than in the U.S. economy. Volatility in the Canadian-U.S. exchange rate that arose from the uncertainty created by SARS and BSE has diminished (Chart 49).

The higher value of the Canadian dollar affects the financial system through several channels. It may adversely affect the profitability of corporations that have a substantial net exposure to foreign trade.<sup>16</sup> It will also affect the value of various financial assets and liabilities. For example, firms (including financial institutions) with net U.S.-dollar liabilities would benefit (e.g., through a decline in the Canadian-dollar value of debt), while those with net U.S.-dollar assets could be adversely affected. Some Canadian financial firms have reported an adverse impact on foreign earnings as a result of the

**Chart 48 Relative Performance of Currencies vs. the U.S. Dollar****Chart 49 Exchange Rate (U.S./Can.) and Volatility**

15. See article by King, on page 77 of this Review.

16. See Bank of Canada (2003, 24).

dollar's appreciation, but this has occurred within an environment of strong overall profitability. Canadian firms have generally reported strong profits in recent quarters.

### Financial institutions

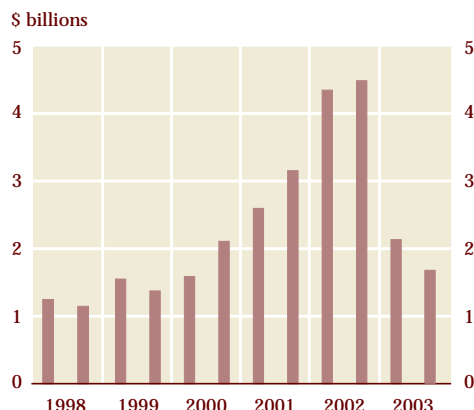
The Canadian banking system reported strong financial results in the second half of the fiscal year (ending 31 October). The major banks recorded an average return on equity of almost 20 per cent in the third quarter, declining somewhat in the fourth quarter.<sup>17</sup> Regulatory capital held by banks rose to record levels (12.8 per cent).

Bank profitability was aided by a reduced need to add to loan-loss provisions. After sharply increasing the pace at which they added to provisions over the last couple of years in the face of declining credit quality, new loss provisions fell to \$3.8 billion in 2003 (Chart 50).

While banks have faced higher losses on their corporate loan exposures, retail banking has proved to be a relatively stable source of revenue. As a result, several banks have indicated that they are increasing the emphasis on their retail and wealth-management operations, while selectively reducing their corporate exposures.<sup>18</sup> Some banks are making substantial portions of their "non-core" corporate exposures available for sale on secondary markets and taking writedowns as they are revalued. Exposures to sectors that have experienced significant financial problems, such as telecommunications and cable, and power and power generation, have fallen.

Risks facing the banking system have declined, given the improved climate for credit quality. Uncertainty over the economic outlook, partly arising from the appreciation of the Canadian dollar, nevertheless raises the possibility of deteriorating financial conditions in some sectors to which the banks are exposed. However, their overall exposure to sectors that are likely to be most negatively affected by the dollar's appreciation (e.g., forest products, steel and other metal products, computer and electronic product

**Chart 50 Provision for Credit Losses: Major Canadian Banks\***

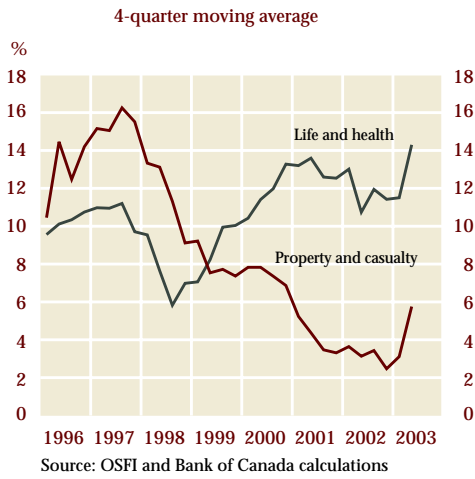


\* Calculated from quarterly financial statements published by the six major Canadian banks  
Source: Bank of Canada

17. A one-time tax-related gain added substantially to third-quarter earnings at CIBC.

18. For further discussion of the Canadian banking system, see Highlighted Issues, page 4.

**Chart 51 Return on Equity of Insurance Industry**

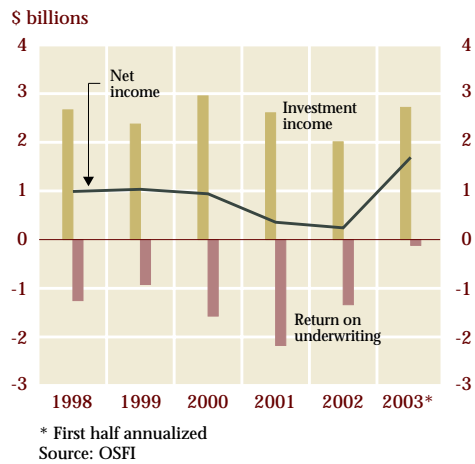


manufacturing, and motor vehicle parts) is relatively limited.

Financial results for the insurance industry, both life insurance companies and property and casualty companies, improved in the first half of 2003 (Chart 51). Life insurance companies in particular have posted favourable results during recent years. This has occurred despite their expansion into equity-based insurance products in the 1990s, and exposures to problem credits.

In September, Manulife Financial announced that it had reached agreement with U.S.-based John Hancock Financial to merge the two companies. If the required approvals are received, it is anticipated that the merger would occur in the first half of 2004. The merger would make Manulife the sixth-largest insurer (based on premiums) in the United States. The proposed merger follows that of two Canadian life insurance companies, Great West Lifeco and Canada Life, earlier this year.

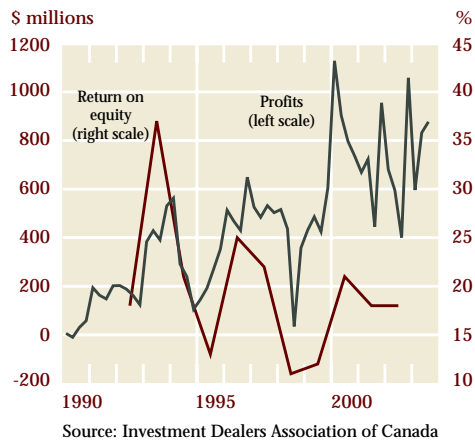
**Chart 52 Net Income of Property and Casualty Industry**



The improvement in the profitability of property and casualty companies was from depressed levels. The industry has typically faced negative returns on insurance underwriting, which have been offset by investment income (Chart 52). However, rising underwriting losses (because rising claims were not fully offset by increased premium revenue) were accompanied by a decline in investment returns, such that net income fell sharply in 2001–02. The industry has moved to curb underwriting losses, partly through higher premium income.

The pace of increase in premiums has been contentious, as a number of businesses have identified rising insurance costs as a significant component in recent cost increases. Some provinces have proposed or undertaken initiatives with respect to the non-life insurance industry, generally with the objective of restraining increases in automobile insurance premiums. The longer-term impact of mandated changes in automobile premiums and limits on certain claims for the industry are not yet clear.

**Chart 53 Operating Profits: Securities Industry**



Operating profits in the securities industry, which have generally remained at historically high levels despite the earlier pullback in equity markets, rose in the second and third quarters (Chart 53). Revenues from investment banking activities have benefited from strength in (gross) corporate borrowings. The pace of common equity financings picked up in the second

quarter (Chart 54), while the issuance of income trust units was at robust levels. Net sales of mutual funds have been slower to recover, as investors have apparently focused on other products, such as exchange-traded funds (ETFs) and income trusts. Outstanding debt in dealer-client margin accounts remains well below earlier peaks, suggesting that investors still remain cautious with respect to equity markets (Chart 55).

### Clearing and settlement systems

Systems designed to clear and settle payments and other financial obligations are a key element underpinning the Canadian financial system (Box 6).

#### Recent developments

In July 2003, most equities that settled in the system called SSS/BBS were migrated to CDSX, the Canadian Depository for Securities' new settlement system, which began operating in March.<sup>19</sup> The migration of all remaining debt and equity issues in SSS/BBS to CDSX was finalized by the end of October, and SSS/BBS has now ceased settlement operations. CDSX now settles virtually all Canadian debt and equity instruments denominated in Canadian dollars. The migration to CDSX, which has strong risk controls, reduces risks previously associated with the settlement of instruments through SSS/BBS.

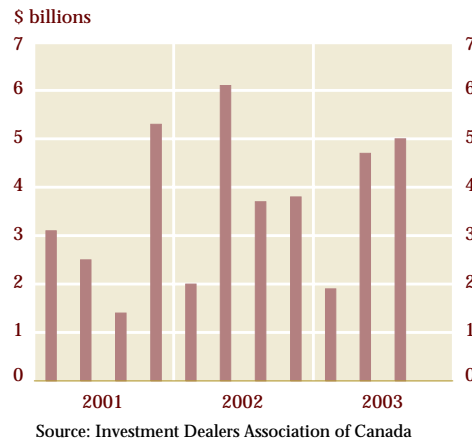
As of 1 November 2003, the Bank of Canada no longer backdates the results of the payments settling through the ACSS. Thus, the results of the ACSS settlement process will be recognized on the central bank's books when the items actually physically settle in the system, the day after the items are presented to be cleared. As a result, the clearing gains and losses of ACSS participants will no longer be reflected on the Bank of Canada's balance sheet in the form of deposits or advances on the day an item is cleared, but will appear on the balance sheet of the direct clearers as items in transit. Settlement risk does not change, but the reporting of this exposure is now on the financial statements of those who bear the risk.<sup>20,21</sup>

19. For more on CDSX, see McVanel (2003).

20. This change in the Bank's accounting does not affect the manner in which the Bank of Canada implements monetary policy.

21. For more on the move to next-day settlement in the ACSS, see Tuer (2003).

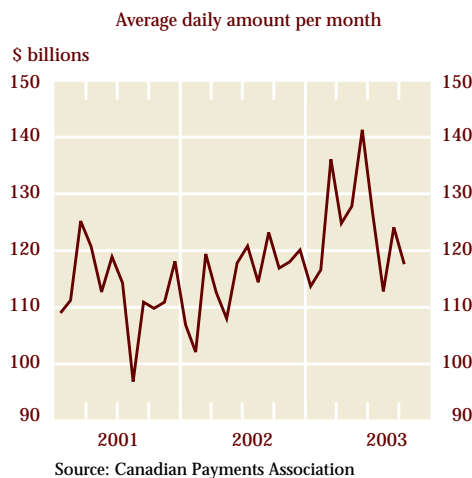
**Chart 54 Common Equity Financing: New Issues**



**Chart 55 Outstanding Debt in Client Margin Accounts**



**Chart 56 Value of Payments Processed by the LVTS**





## Box 6

## Clearing and Settlement Systems in Canada

An essential component of the financial system is a robust set of arrangements to clear and settle payments and other financial obligations. Under the Payment Clearing and Settlement Act, the Bank of Canada designates, and has oversight responsibilities for, payment and other clearing and settlement systems that have the potential to pose systemic risk.

The Bank has designated and currently oversees the Large Value Transfer System (LVTS) for the exchange of large-value and time-sensitive payments, operated by the Canadian Payments Association, and CDSX for the clearing and settlement of Canadian debt and equity transactions, operated by the Canadian Depository for Securities. It has also designated and shares oversight responsibility with other central banks (including the U.S. Federal Reserve, the lead overseer) for the Continuous Linked Settlement Bank (CLS Bank). The CLS Bank is an international system for the settlement of foreign exchange transactions and currently deals in eleven currencies, including the Canadian dollar.

The Bank of Canada supplies services to the LVTS, CDSX, the CLS Bank, and the Automated Clearing Settlement System (ACSS), with the ACSS settling mostly smaller-value retail payments. The Bank provides settlement assets and liquidity, collateral and settlement-agent services, and also provides contingency arrangements for these settlement systems.

In August 2003, the six-month grace period for implementation of the \$25 million cap on paper items clearing through the ACSS ended. This cap is intended to encourage the migration of these large payments to the LVTS, which has stronger risk controls (Chart 56). A survey taken during 2001 put daily flows of transactions in the ACSS exceeding \$25 million at about \$7 billion. In the September-October period, ACSS values had fallen by about \$4 billion below their year-earlier levels, to an average of about \$16 billion per day (Chart 57).

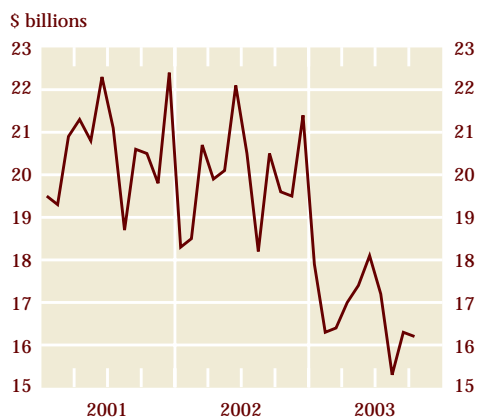
Four new currencies began settling through the CLS Bank in September 2003. These include the currencies of Sweden, Denmark, Norway, and Singapore. Settlement of foreign exchange trades through the CLS Bank in all currencies increased steadily to average about US\$1 trillion per day through September and October. Canadian trades settled through the CLS have also grown to average about Can\$19 billion per day over the same period, but the proportion of Canadian-dollar trades settled through the CLS remains at relatively low levels compared with other initial CLS currencies. The liquidity ratio (the ratio of the liquidity required to settle Canadian foreign exchange trades in the CLS, or “payins,” divided by the value of trades settled) stands at about 10 per cent and is a measure of the liquidity savings generated by CLS settlement (Chart 58).

In June 2003, the board of the Canadian Payments Association approved a decision to move to Truncation and Electronic Cheque Presentation (TECP) with implementation targeted for late 2006. This will represent a fundamental change in the way that cheques are processed and cleared. With TECP, the electronic data image of cheques will be captured and forwarded to the relevant financial institutions, and the six million cheques and other paper items currently processed each day will no longer be physically exchanged. This will greatly increase efficiency in the cheque-processing system.

Overall, the impact of the 14 August power outage (and its continued effects in the days that followed) on the Canadian financial system was not severe. Business-continuity plans allowed clearing and settlement systems and their participants to respond well despite a few power-outage-related problems. When the power outage occurred, the CDSX settlement process had just begun, and settlement was delayed by about

**Chart 57 Value of Payments Processed by the ACSS**

Average daily amount per month



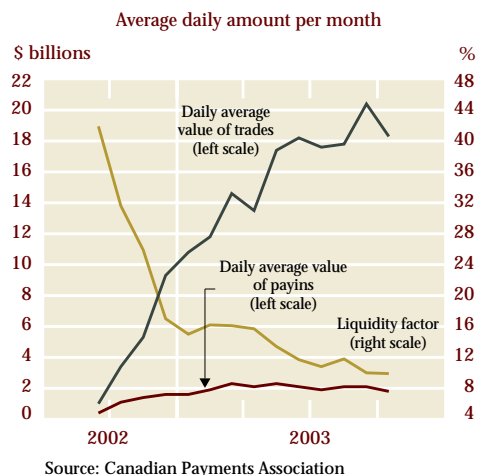
Source: Canadian Payments Association

one hour, with no significant consequences for other clearing and settlement systems. On 15 August, the Bank of Canada responded to the increased demand for LVTS funds by financial institutions which arose from the uncertain effects of the blackout on their own operations and those of their clients. The target LVTS balance was increased to \$1.1 billion from the \$50 million announced the previous evening, and the Bank executed two rounds of Special Purchase and Resale Agreements. The Bank of Canada moved to its second site for more than a week following the outage, where operations were carried out successfully.

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**Chart 58 Value of Canadian-Dollar Foreign Exchange Trades Settled by the CLS Bank**



# Reports



# Introduction

**R**eports address specific issues of relevance to the financial system (whether institutions, markets, or clearing and settlement systems) in greater depth.

Both of the reports in this issue examine the robustness of the Canadian financial system. One focuses on Canadian fixed-income markets, and the other looks at the Canadian financial system more generally.

The Canadian corporate debt market has grown rapidly over the past decade and, by any standard, can be considered well developed. Nevertheless, a significant proportion of the debt issuance by Canadian non-financial corporations takes place in foreign capital markets, especially in the United States. This proportion has remained relatively constant over the past decade. The report, *Development of the Canadian Corporate Debt Market: Some Stylized Facts and Issues*, explores the characteristics of U.S.-dollar borrowing by Canadian corporations and the salient features of Canadian and U.S. capital markets.

In addition to financial markets, the financial system consists of institutions and clearing and settlement systems. Given the growing size and complexity of the financial system, sources of stress can emerge from several avenues. The second report, *Measuring Financial Stress*, discusses one particular new approach for examining the degree of stress under which the Canadian financial system is operating. This new measure complements the many tools used at the Bank of Canada to understand financial conditions.



# Development of the Canadian Corporate Debt Market: Some Stylized Facts and Issues

Stacey Anderson, Ron Parker, and Andrew Spence

**Table 1**  
**Outstanding Non-Financial Corporate Debt:**  
**December 2002**

Per cent

Country	Share of global corporate debt placed		Share of total global corporate debt market	Proportion of debt placed in domestic market
	Internationally	Domestically		
United States	27.8	54.5	48.6	87.3
Australia	1.1	1.3	1.2	80.8
United Kingdom	14.1	5.9	7.7	59.4
Sweden	1.5	0.5	0.7	53.8
Canada	6.7 (4) <sup>a</sup>	1.6 (6)	2.7 (5)	45.5 (15)
France	16.0	2.9	5.8	38.7

a. Figures in parentheses indicate Canada's ranking in a sample of 20 industrialized countries.

Source: Bank for International Settlements *International Banking and Financial Market Developments, Quarterly Review*, June 2003, Tables 12C and 16B

Over the last five to ten years, the Canadian corporate debt market has grown rapidly. The outstanding stock of corporate debt now represents about 30 per cent of the total outstanding stock of debt, up from about 18 per cent in 1990 (Freedman and Engert 2003; Miville and Bernier 1999). This rise in the share of corporate debt is partly the result of fiscal restraint by governments and the resultant decline in the ratio of government debt to GDP over the last eight years.

One striking feature of the debt of Canadian corporations is the proportion issued in U.S. capital markets. In an international context, Canadian non-financial corporations are relatively large users of debt markets (Table 1). Canadian non-financial corporations rank fourth in the world in issuing debt in international markets, primarily in the United States, and sixth for issuance in the domestic market. The relative ease with which Canadian issuers can access the deep, liquid U.S. market is also illustrated in Table 1 by the comparatively low proportion of domestic debt issuance relative to total debt issuance. Indeed, of the major industrialized countries, only France shows a greater reliance on offshore markets by its non-financial corporations.

To better understand the reasons behind the relatively greater reliance of Canadian borrowers on U.S. markets, it is instructive to examine the characteristics of the Canadian marketplace.<sup>1</sup> For instance, the Canadian high-yield market is small relative to that in the United States. In Canada, higher-risk firms receive credit

1. For additional discussion on the use of the U.S. dollar in Canada, see Murray, Powell, and Lafleur (2003).

primarily through bank loans, private placements, and, in some cases, income trusts. These sources of funding are generally supplemented by tapping into the U.S. high-yield debt market, which is accessed by many non-U.S.-resident firms from all over the world and can be thought of as a global rather than a U.S. market.

This use of the U.S. capital markets may well be the result of purely market forces. To gain some insight on this issue, we explore some of the characteristics of U.S.-dollar borrowing by Canadian corporations, U.S.-dollar borrowing patterns by industry, concentration across asset managers and investment dealers, and the scale of large Canadian corporations relative to the size of Canadian banks.

We find that the absolute size of U.S.-dollar-denominated pools of assets and the industrial composition of issuance help to explain why Canadian firms issue U.S.-dollar-denominated debt. In our view, it is unlikely that concentration in the asset-management business or investment banking in Canada is a significant factor, since concentration is similar to that in other markets. The data also suggest that the capitalization of the Canadian banking sector is sufficient to meet the needs of the largest Canadian corporations for Canadian-dollar funding.

### Issuance of U.S.-Dollar Debt by Canadian Corporations

A significant proportion of all debt issued by Canadian corporations is denominated in U.S. dollars and raised in U.S. debt markets. Indeed, since 1993, an average of 48 per cent of all corporate debt issuance has been denominated in U.S. dollars. While this share fluctuates from year to year, it has no clear trend (Table 2). The data suggest that Canadian firms use U.S. markets partly because the pool of available funds is simply larger. The majority of issuance in Canadian-dollar debt markets in the early 1990s was in the range of up to Can\$250 million (Chart 1). By contrast, U.S.-dollar-denominated financing saw significantly more issues of up to Can\$500 million in size (Chart 2). In the second half of the 1990s, the size grew in both countries, but the bigger issues tended to be distributed in the U.S. market.

The smaller size of issues placed in Canada is largely a function of the smaller number of asset managers, together with the smaller average size

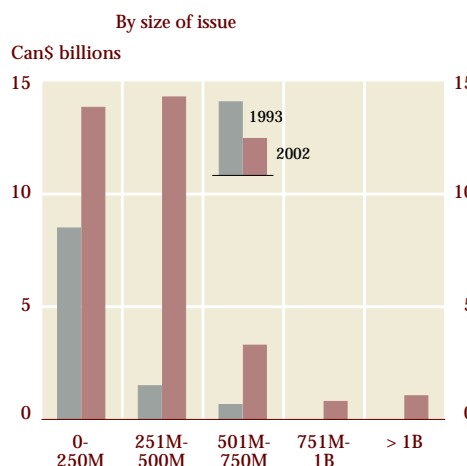
**Table 2**  
**Size and Distribution of Debt Denominated in U.S. Dollars and Canadian Dollars by Corporations Resident in Canada**

Gross flows

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Average Size - Can\$ millions										
US\$	210	190	160	180	270	260	380	360	450	350
Can\$	90	80	60	98	120	140	130	150	140	140
Distribution - Percentage										
US\$	52	51	62	52	48	51	43	23	54	43
Can\$	48	49	38	48	52	49	57	77	46	57

Source: *Financial Post* New Issues Database

**Chart 1 Canadian-Dollar Gross Issuance of Canadian Corporations**



Source: *Financial Post* New Issues Database



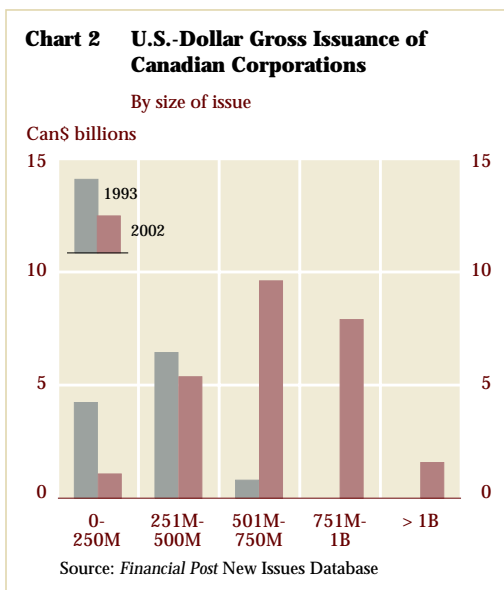


Table 3

**Distribution of US\$ Fixed-Income Funding by Industrial Sector: Major Concentrations**

Per cent of total US\$ issuance by Canadian firms

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Oil and gas exploration and production	7	10	7	9	7	5	-- <sup>a</sup>	7	11	15
Paper and forestry	8	17	15	8	2	6	9	18	4	4
Metals and minerals	3	6	5	6	--	--	--	--	--	9
Banks	15	14	7	22	24	22	41	33	11	27
Other financial services	3	--	4	7	8	2	6	12	21	12
Movies and entertainment	7	5	--	--	23	20	--	1	--	--
Telecom services	--	--	21	8	12	7	17	13	19	6
Railroads	6	5	--	--	--	5	--	--	5	--
Total	49	57	59	60	76	67	73	84	71	73

a. -- indicates that the industry was not among the top 8 industries by issuance for a given year.

Source: *Financial Post* New Issues Database; Gross flows

of funds under their management. These demand-side factors constrain the size of Canadian-dollar issues because Canadian asset managers must avoid excessive risk concentration in single issues. There are many more asset managers in the United States, with portfolios of much larger size relative to those in Canada. These U.S. asset managers require participation of between US\$50 million and US\$100 million, which would be a significant share of any Canadian-dollar issue. Because the absolute size of the U.S. portfolios is greater, new additions to these portfolios must be larger to have any measurable effect on their overall performance.

Large Canadian firms also benefit from issuing in the U.S. market. Significant cost savings can flow to firms that make single large issues. Distribution costs are also significantly lower if an issue can be distributed across a few asset managers in large amounts. The issue must be large enough, however, to avoid the distortion in price that could result from placing the issue with too few asset managers.

In summary, the differing sizes and requirements of asset managers in Canada and the United States, as well as cost considerations for large issuers, are consistent with differences in both the average issue size and distribution.

## Issuance of U.S.-Dollar Debt by Industry

By far the largest, and most consistent, issuers of U.S.-dollar-denominated debt are financial institutions, all of which are assigned very high credit ratings (Table 3). They have accounted for about 22 per cent of the total U.S.-dollar issuance since 1993 and an impressive 41 per cent of issuance in 1999. This likely reflects their multinational status and transborder expansion through the 1990s. Many Canadian banks followed a North American continental expansion strategy, and a good deal of expansion in the trading aspects of their businesses through the 1990s was pursued in London and New York, rather than in Toronto. As well, most Canadian banks have significant U.S.-dollar-denominated loan books, and there are strong incentives for the banks to match these assets with U.S.-dollar liabilities.

Canadian resource companies tend to be fairly regular issuers of U.S.-dollar debt, and this reflects their revenues, given that resource

commodities are priced in U.S. dollars. Pulp and paper, forestry, and oil and gas extraction industries have a fairly steady demand for U.S.-dollar debt, although there are cycles around trends in response to swings in commodity prices. These companies may also shift their debt issuance activity between U.S. and Canadian dollars to arbitrage cyclical differences in interest rates between Canada and the United States to secure the lowest-cost financing.

There appears to be one exception to this pattern, and that is the telecommunications industry, which began issuing large amounts of U.S.-dollar debt in 1995. It appears that most of these companies, which were primarily lower-rated, could secure the necessary financing only in the U.S. high-yield market. This market was deep enough to avoid the single-name exposure limits that simply could not be absorbed in the much smaller Canadian institutional sector.

Finally, for the years 1997 and 1998, the movie and entertainment industry accounted for just over one-fifth of issuance. This resulted from Seagrams radically changing its business lines and embracing businesses in the entertainment industry. The one-off debt-financing activities of Seagrams accounted almost exclusively for the activity in this industry segment. Thus, these transactions have no longer-run implications for either the current structure of Canadian financial markets, or their future viability.

## Concentration of Asset Management

The concentration of assets managed by Canadian institutional managers does not appear to differ greatly from that of other major countries. It is thus unlikely to contribute to any significant divergence in the development of capital markets in Canada relative to other countries.

As Table 4 shows, there is considerable concentration across Canadian asset managers, with ten firms controlling 50 per cent of all assets and the top two holding about 25 per cent. Nonetheless, concentration in Canada is similar to concentration in both the United States and Europe. Gini coefficients—the difference between the actual distribution and an equal distribution—do not vary greatly between countries. However, a somewhat lower coefficient for the United States suggests a marginally more equal distribution.

Table 4

### Concentration among Asset Managers

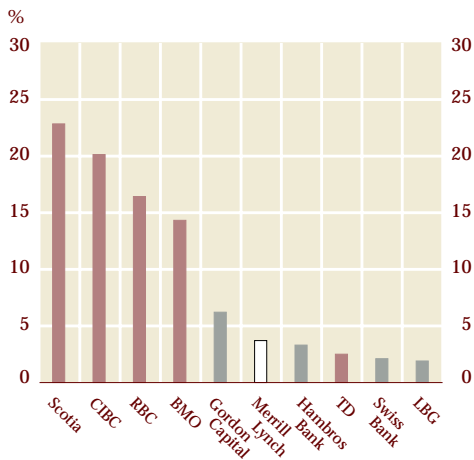
Per cent of assets	Canada <sup>a</sup> (2001)		United States (2001)		Europe (2000)	
	Number of asset managers	Funds under management (Can\$ billions)	Number of asset managers	Funds under management (US\$ billions)	Number of asset managers	Funds under management (€ billions)
10	1	68	2	1,639	1	1,602
25	2	119	6	4,139	4	4,277
50	10	245	16	8,227	11	7,793
Gini coefficient <sup>b</sup>	29.5		25.9		29.6	

a. Data for Canada are for pension funds only.

b. The Gini coefficient is calculated for the top 100 asset managers in each case. The closer the Gini coefficient is to 100, the more unequal the distribution.

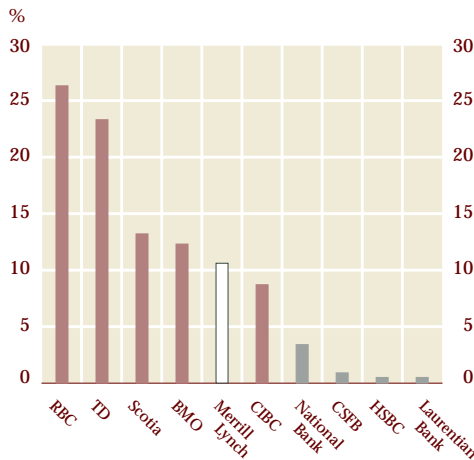
Source: United States and Europe: *Institutional Investor*, various issues; Canada: *Benefits Canada* April 2002

**Chart 3 Market Shares of the Top 10 Dealers**  
(First lead; Canadian-dollar deals) - 1993



Source: Financial Post New Issues Database

**Chart 4 Market Shares of the Top 10 Dealers**  
(First lead; Canadian-dollar deals) - 2002



Source: Financial Post New Issues Database

It is hard to argue that concentration of asset management has impeded the level of development of Canadian fixed-income markets, since concentration is similar across countries. However, the assets managed by the top manager in Canada are small, at Can\$68 billion, compared with those in the United States, at US\$854 billion, and Europe, at €1,602 billion. This may have, through limits on single-name exposures, a strong effect on the size of corporate issues that can successfully come to the Canadian-dollar market at any one time.

## Concentration among Dealers

Canadian-resident securities dealers are overwhelmingly dominant in the provision of Canadian-dollar fixed-income services in Canada. Through the 1990s and into the early years of the current decade, Canadian dealers had an average market share of 90 per cent of lead deals, ranging from a low of 82 per cent in 1994 to a high of 97 per cent in 2001. Charts 3 and 4 show market shares for the beginning and end of the period under review. The top dealer tends to win about 25 per cent of all leads, and the same major dealer usually dominates the top spot. Foreign penetration has remained minimal, but Merrill Lynch has emerged as the dominant foreign-based dealer.<sup>2</sup>

The market share of domestic dealers in local currency deals in the United Kingdom and Australia is considerably smaller, with the United Kingdom at roughly 40 per cent and Australia at 54 per cent. However, domestic concentrations in the United States and Sweden are both relatively high in the range of 80 to 90 per cent.<sup>3</sup>

For countries with a limited presence of foreign dealers in their domestic fixed-income markets, fixed-income market share is likely a function of credit granted by the banks/dealers and the depth of product lines offered to local-currency-

2. Merrill Lynch first came to Canada in the early 1950s.
3. U.S. data include the fixed-income activities of Deutsche Bank and CSFB. Even though both are European-based banks, both acquired significant former U.S. investment banks that had well-established domestic businesses. Excluding these two institutions reduces the domestic market share to 60 to 70 per cent. U.K. data are based on an informal survey of U.K. authorities and investment dealers. They are subject to a wide margin of error.

based customers (Chart 5). In Canada, for example, very few non-Canadian financial-service providers have fully integrated businesses, and very few have large outstanding credit commitments from which fixed-income business can be levered. An examination of bank balance sheets from the countries mentioned above finds similar degrees of concentration in domestic bank assets. Canadian banks account for 94 per cent of all domestic bank assets, Swedish banks hold about 93 per cent, and domestic banks in the United States provide 90 per cent of all assets to their banking system.

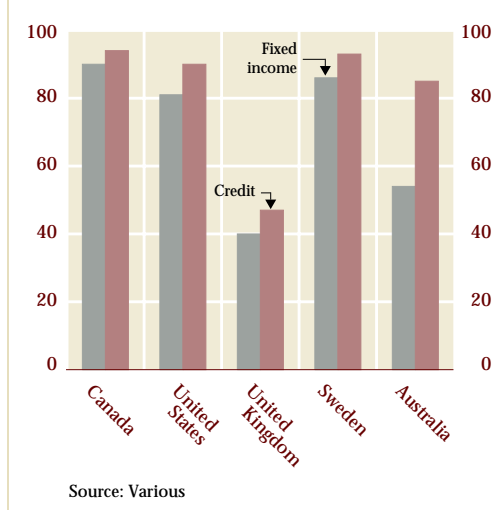
In the countries where foreign participation in the provision of fixed-income services in the local currency is greater, the picture is less clear. In the United Kingdom, the distribution of bank assets is more balanced between domestic and foreign banks, where domestic U.K. banks account for 47 per cent of all bank assets booked, compared with 53 per cent booked at non-British banks. In contrast, Australian banks hold about 85 per cent of the banking system's assets. The apparent inconsistency between fixed-income and credit market shares in Australia may be partly due to the fact that Australia is an English-speaking country close to Asian financial centres, rather than a function of institutional structure. This makes the relationship with the distribution of bank assets more difficult to judge and reflects the difficulties in dividing what are essentially global capital markets according to sovereign legal entities.

The apparent correlation between the granting of credit by domestic banks/dealers and the concentration among domestic dealers suggests that the former may have an important influence on dealer presence in fixed-income markets.

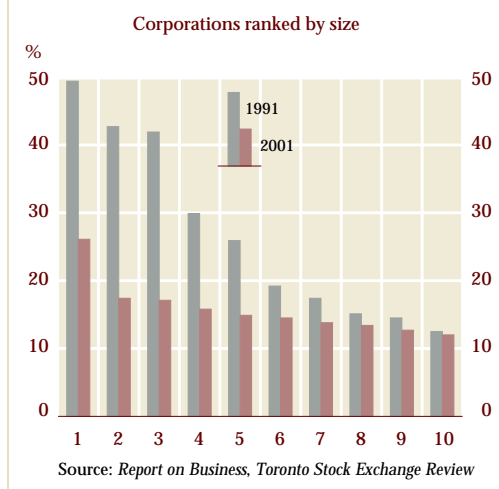
## Canada's Corporations: Not Too Big for Canadian Banks to Handle

One hypothesis examined is that corporate borrowers have shifted into foreign capital markets because of the size of the capitalization of Canadian banks relative to the corporations they serve (Chart 6). Specifically, are the balance sheets of the banks large enough to accommodate large, capital-intensive transactions? Furthermore, would they soon run into single-name exposure limits across financial

**Chart 5 Fixed-Income and Credit Market Shares of Domestic Intermediaries**



**Chart 6 Market Cap of the Ten Largest Corporations Relative to the Big-Five Banks**



products that would constrain the depth of development in Canadian financial markets?

The data suggest that this is not a problem. We examined the relationship between the market capitalization of the big-five Canadian banks relative to the market capitalization of the 50 largest firms listed on the TSX. The data suggest that since 1991, the capitalization of Canadian banks has improved relative to the largest corporations. For example, in 1991 the capitalization of the telecommunications company BCE alone was 50 per cent of the combined capitalization of the big-five banks. By 2001, BCE's capitalization amounted to approximately 20 per cent of the combined big-five capitalization, a significant decrease. Moreover, there is less concentration among the top five corporate borrowers. During 1991, the capitalization of the top five borrowers amounted to 190 per cent of the capitalization of the big-five banks, but by 2001 this had fallen to 90 per cent. In short, it would appear that the big-five banks are adequately capitalized to accommodate the Canadian-dollar funding needs of the largest Canadian corporations, and given the relatively stronger growth in the banks' capitalization, they are less likely to run into constraints on single-name exposure now than they would have at the start of the 1990s.

## Conclusion

Canadian fixed-income markets are generally well developed and encompass a broad range of activities and products. In the future, corporate demand for the services provided by Canadian fixed-income markets is likely to remain robust so long as household income and consumption flows are denominated in Canadian dollars, and borrowing by governments remains at lower levels than in the 1980s and early 1990s.

The factors examined in this report suggest that the sheer size of the pools of funds available in the United States, the importance of the resource sector in Canada, and expansion into the United States by the Canadian financial sector could explain why a significant proportion of the debt issued by Canadian firms is denominated in U.S. dollars. Firms with and without offsetting U.S.-dollar cash flows are able to borrow in the U.S. market without exposure to currency risk. Our informal survey of Canadian investment dealers indicates that, aside from

firms with net cash flow exposures to the U.S. dollar, a very high proportion of Canadian issuers hedge their U.S.-dollar-denominated liabilities in the swap market. This underscores the fact that financial intermediation between borrowers and savers can take place through various channels and that ready access to the large, liquid U.S. debt market serves as a valuable supplement to the domestic market.

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# Measuring Financial Stress

*Mark Illing and Ying Liu\**

**N**umerous events over the past decade have been described as “financial crises”—the Mexican crisis of 1994–95, the 1997–98 Southeast Asian crisis, and the Russian debt default and Long-Term Capital Management crisis of 1998 are a few of the better known. How did these events affect the Canadian financial system?

One way of considering this question is to apply the concept of “stress” to the financial system, drawing on analogies from the physical sciences. Stress is often caused by an outside (exogenous) force acting on a system. It leads to changes in the functioning and integrity of the system that, if great enough, can damage the system itself. Such a change can be thought of as a “crisis.”

The size and diverse makeup of the financial system, which consists of financial institutions, financial markets, and clearing and settlement systems, suggests there are many potential sources of stress. According to this perspective, stress is always present to a degree somewhere in the financial system and may pass largely unnoticed until it reaches high levels or becomes widespread. Thus, a measure of financial stress should be a continuum, where extreme values represent crises.

Stress rises when one or more of the following increases:

- expected financial loss
- risk (a higher probability of loss)
- uncertainty (reduced confidence about the probability of loss)

\* This report draws on a recent Bank of Canada working paper (Illing and Liu 2003).

Stress results from the impact of a shock on the financial system. The amount of stress present in a system therefore depends on the magnitude of these shocks, the initial conditions present in the system, and the structure of the financial system. For example, a negative shock is more likely to cause a large increase in stress when financial conditions are weak, when cash flows are low, balance sheets are highly leveraged, or lenders are more risk-averse. Shocks may also be propagated through weaknesses in the structure of the financial system, such as market-coordination failures, overloaded computer systems, or highly asymmetric flows of information. The size of the shock and its interaction with weaknesses in the financial system determine the level of stress (Chart 1).

Stress can manifest itself in various ways across the financial system, and disruptions in one market can spill over to others (this is known as contagion). For example, adverse movements in market prices and interest rates can impair the value of financial assets, as is the case during a stock market crash. This can be followed by unusually large deposit withdrawals or interruptions in payment flows that strain banking system liquidity.

## How Is Stress Measured?

Although the literature on predicting financial crises in emerging markets is abundant, little attention has been devoted to defining crises or measuring their severity. The standard approach in the empirical literature is to treat stress as a binary variable with either crisis or non-crisis values. Kaminsky and Reinhart (1996, 1999) and Frankel and Rose (1996) are commonly followed examples. Crises are usually defined based on an event study or on the extreme values of one or two variables, such as a sharp

exchange rate depreciation that signifies a foreign exchange crisis.

This approach is popular because it allows the application of binary-choice models to estimate the probability of crises in emerging markets. However, the technique does not distinguish between the severity of different stressful events, and it has not been successfully applied to industrialized economies, where full-blown crises are rare.

As a result, only a few studies have attempted to quantify stress as a continuous variable in the context of well-developed financial systems. Bordo, Dueker, and Wheelock (2000) develop an index for the United States based on bank losses, business failures, real interest rates, and bond-yield spreads.

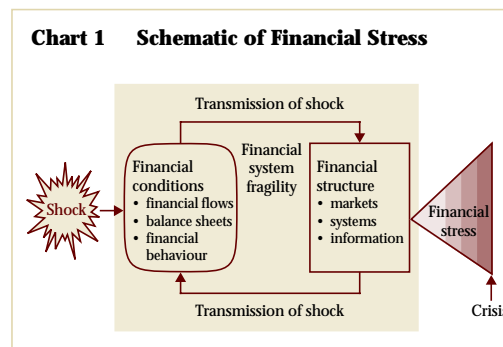
Several organizations have also created stress indexes. BCA Research publishes a monthly stress index for the United States based on variables similar to those in the Bordo et al. index, as well as on several stock market indicators (McClellan 2001). J.P. Morgan Chase & Co. publishes a global Liquidity, Credit, and Volatility Index (LCVI) based on daily bond, foreign exchange, and stock market indicators (Kantor and Caglayan 2002). The financial stress index (FSI) developed by Illing and Liu (2003), which is the basis of this summary report, is the first such measure for Canada.

## A Survey of Financial Stress

To improve the accuracy with which our index reflects stress in the Canadian financial system, it was benchmarked against the results from a Bank of Canada survey. Senior staff members were asked to subjectively rank the severity of 41 different events over the past 25 years in terms of how much stress the Canadian financial system was perceived to be under at the time.

The list of events surveyed was drawn from a review of Bank of Canada *Annual Reports* since 1977 and *Monetary Policy Reports* since 1995. Events were included if they were explicitly identified as having had a significant impact on Canadian markets. Ten of these events were ranked as “highly stressful” according to the survey (in chronological order):

- the August 1981 spike in interest rates, when mortgage rates reached almost 22 per cent





- the less-developed countries (LDC) debt crises of the early 1980s, to which Canadian banks were heavily exposed
- the regional Canadian bank failures of 1985
- the October 1987 stock market crash
- the real estate price collapse, loan losses, and debt defaults of the early 1990s
- the Mexican peso crisis (1995)
- the Southeast Asian crisis (1997–98)
- the Russian/LTCM crisis (1998)
- the high-tech stock market collapse (2000)
- the events of 11 September 2001

## Variable Selection

The next step involved determining which variables best reflected the qualitative rankings from the survey and weighting them appropriately.

Over 150 different measures of expected loss, risk, and uncertainty were considered. These were drawn from the financial institutions sector and from the foreign exchange, fixed-income, and equity markets. The rankings from the survey helped to determine which variables were best suited for the index. Several alternative weighting schemes were also tested.

The final results are quite robust to the choice of variables and weighting schemes. The specification of the financial stress index that most closely matches the survey rankings includes the following measures of expected loss, risk, and uncertainty.

Variables that primarily reflect expected loss:

- the spread between the yields on bonds issued by Canadian financial institutions and on government bonds of comparable duration
- similarly, the spread between the yields on Canadian non-financial corporate bonds and on government bonds
- because the capacity to repay debt can be affected by short-term fluctuations in interest rates, the inverted term spread is also included in the index (i.e., the 90-day treasury bill rate minus the yield on 10-year government bonds)

Variables that primarily reflect risk:

- the beta ( $\beta$ ) variable derived from the total-return index for Canadian financial institutions ( $\beta$  is a measure of how risky a stock, or group of stocks, is relative to the overall market)
- volatility of the Canadian dollar<sup>1</sup>
- Canadian stock market volatility<sup>2</sup>

Variables that primarily reflect uncertainty:

- the difference between Canadian and U.S. government short-term borrowing rates (the difference is adjusted for exchange rate risk using the covered-interest-parity condition)
- the average bid/ask spread on Canadian treasury bills<sup>3</sup>
- the spread between the rates on 90-day Canadian commercial paper and treasury bills

## Weighting Methodology

The daily value of each variable is first weighted by its sample cumulative distribution function. For example, if the value of a variable on a given day exceeds 75 per cent of all previously observed values, then it is given a ranking of 75. Next, each variable is weighted by the relative size of the market to which it pertains. The larger the market's share of total credit in the economy is, the higher the weight.

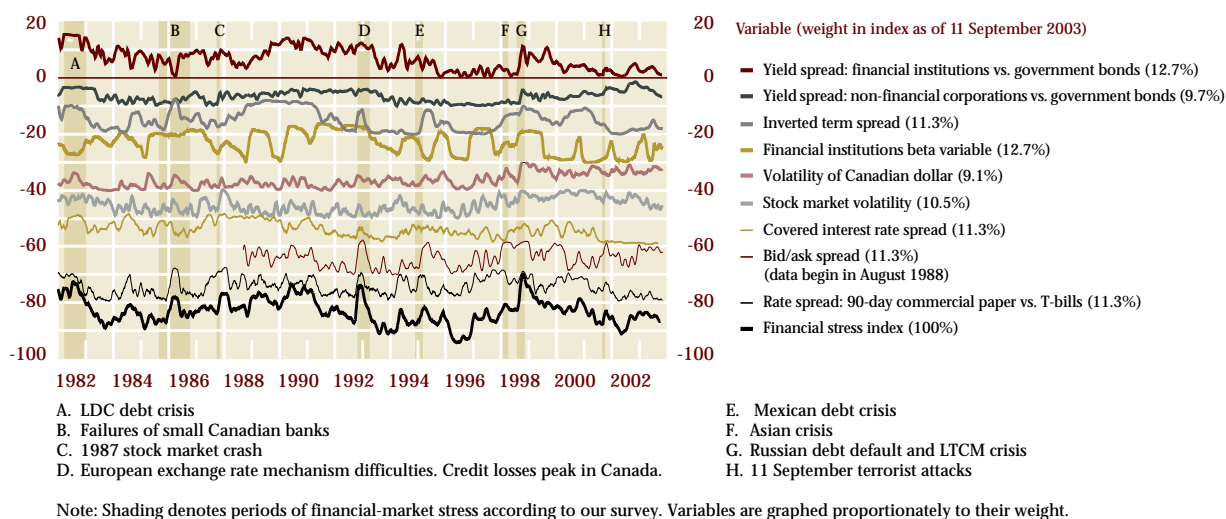
More formally, the index described above can be expressed as

$$FSI_t = \sum_j \left[ w_{jt} \cdot \int_{-\infty}^{x_{jt}} f(x_{jt}) dx_{jt} \right] \cdot 100,$$

where  $x_{jt}$  is the value of the  $j$ th variable (from the nine variables listed above) on day  $t$ , and  $w_{jt}$  is the credit weight. The integrated term is the estimated cumulative distribution function for  $x_j$  based on the historical sample.

1. We use a trade-weighted average of the dollar versus the currencies of Canada's six largest trading partners and apply a general autoregressive conditional heteroscedastic (GARCH) model to measure the volatility.
2. We use the S&P TSX index and apply a GARCH model to measure the volatility.
3. The "bid" and "ask" rates are those at which securities dealers, acting as market middlemen, will sell and buy treasury bills.

**Chart 2 Financial Stress Index: Component Breakdown**



The individual historical contribution of each component to past movements in the FSI is shown in Chart 2.

## Alternative Measures of Stress

Alternative measures of stress were constructed using Canadian data and the various methods employed in other empirical studies. These included the straightforward binary measures of stress commonly used in studies of financial stability in emerging markets, as well as the more comprehensive measures of stress for industrialized countries discussed earlier. The last measures were far more successful at matching the survey rankings, while the former frequently identified tranquil periods as being crises. Overall, however, the FSI provided the closest match.

Charts 3 and 4 illustrate four different measures of financial stress for Canada. Although the BCA Research (BCA) and Bordo, Dueker, and Wheelock (BDW) indexes were originally developed for the United States, we apply their respective methodologies to Canadian data. On the other hand, the J.P. Morgan LCVI is based on global data.<sup>4</sup> Interestingly, movements in the FSI,

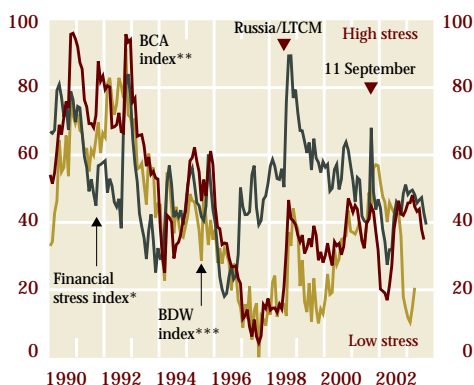
which is based entirely on Canadian data, and the LCVI are quite similar (the correlation coefficient between the two indexes is 0.63).

## The Evolution of Stress

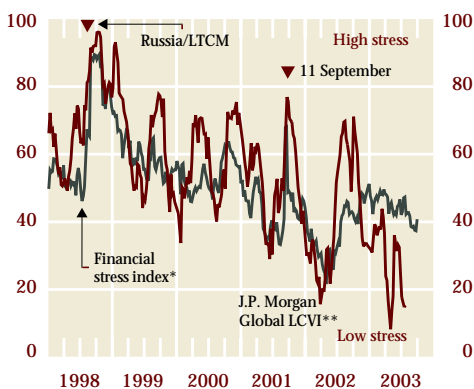
The FSI, BCA, and BDW indexes all reached their highest values during the recession of the early 1990s. This coincided with a collapse of real estate prices in Canada, particularly for commercial properties. Business and personal bankruptcies also rose sharply, as did mortgage and credit card arrears, commercial and industrial loan losses, and bond defaults. The end of this period also witnessed heightened foreign exchange and interest rate volatility resulting from the difficulties of the European exchange rate mechanism in late 1992.

The level of stress generally trended downwards over the 1994–97 period. It rose suddenly in August of 1998, following Russia’s debt default. The subsequent collapse of the world’s largest hedge fund, Long-Term Capital Management (LTCM), marked a period of extreme movements in market prices and rates. The BCA and BDW indexes rose sharply during this period, although they were well below the levels of stress indicated by the FSI and the LCVI.

4. Data for the LCVI begin in October 1997.

**Chart 3 Monthly Measures of Financial Stress**

\* Source: Illing and Liu (2003)  
 \*\* Using McClellan (2001) methodology applied to Canadian data  
 \*\*\* Using Bordo, Dueker, and Wheelock (2000) methodology applied to Canadian data

**Chart 4 Daily Measures of Financial Stress**

\* Source: Illing and Liu (2003)  
 \*\* Source: J.P. Morgan Chase & Co.

Financial stress also rose sharply following the terrorist attacks of 11 September 2001. Many stock markets were temporarily closed, and bond market trading was widely curtailed. However, the financial system was more robust than it had been during previous shocks, and the effects dissipated quickly. In particular, no serious problems materialized at major banks, securities dealers, or insurance and reinsurance firms.

Recently, financial stress appears to be in the moderate-to-low range. The resiliency of the Canadian financial system to numerous shocks over the past two years has been remarkable. Low and stable inflation has enabled interest rates to remain low, thereby limiting financial pressures on debtors. The balance sheets of financial institutions and non-financial firms are also in a much stronger position than they were a decade ago.

## Interpretation and Summary

The financial stress index complements the many other tools used at the Bank of Canada to assess whether financial conditions are improving or deteriorating. The specific level of the index has no implications for policy, and in no sense should the index be seen as a target.

The FSI is an ordinal measure of stress in the financial system, meaning that it is a ranking of the current situation relative to history. A change in the level of the index may not correspond to the same change in actual stress, however.

The weighting of the components by their shares in credit involves a certain arbitrariness. Thus, one cannot claim that this index has the optimal weights for measuring stress. It should be noted, however, that the weights are approximately equal across the components, and thus it is not just one or two components that are driving the behaviour of the index.


The FSI should prove useful for future research on financial stability. In particular, one might find certain threshold levels of the index at which financial pressures spill over into the real economy.

The FSI is intended to capture the contemporaneous level of stress in the system and is not designed to have strong predictive power for future stress. The FSI could therefore be used as a

dependent variable in econometric models to identify and test leading indicators of stress. These models could then form the basis of early-warning indicators of potential instability in the financial system or in the broader economy.

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**P**olicy and  
**I**nfrastructure  
**D**evelopments



# Introduction

**T**he financial system and all of its various components (institutions, markets, and clearing and settlement systems) are supported by a set of arrangements, including government policies, that influence its structure and facilitate its operation. Taken together, these arrangements form the financial system's infrastructure. Experience has demonstrated that a key determinant of a robust financial system is the extent to which it is underpinned by a solid, well-developed infrastructure. This section of the Review highlights work in this area, including that related to relevant policy developments.

A key element in a well-functioning financial system is easy access by market participants to the information they need for making sound financial decisions.

During the past couple of years, a series of revelations regarding questionable corporate accounting and governance practices, primarily in the United States, damaged investor confidence in financial statements and corporate governance. *Restoring Investor Confidence: Background on Recent Developments in Canada* summarizes the initiatives currently underway to enhance domestic governance practices. While improved regulatory and financial reporting structures should be helpful, their effectiveness will have to be assessed over time.

The recent development of alternative (i.e., electronic) trading systems promises to improve transparency within securities markets. *Transparency in the Canadian Fixed-Income Market: Opportunities and Constraints* describes the growing presence of these systems in Canada. Their arrival has necessitated the development of an appropriate set of guidelines, and the Bank of Canada is involved in this process.

Also underpinning financial markets, and indeed all commercial activity in Canada, is the retail payments system. While many types of payment instrument are easily recognized (e.g., cash, cheques, and debit and credit cards), the system that transfers the associated funds between individuals, businesses, and government entities is less well known. *Policy Issues in Retail Payments* examines the pressures for change in this area, arising partly from new information technologies.





# Restoring Investor Confidence: Background on Recent Developments in Canada

*Jim Armstrong*

**B**usiness failures caused by inadequate corporate governance and deficiencies in corporate financial reporting are by no means new. However, recent high-profile cases in the United States such as Enron, Worldcom, and others, as well as many lesser cases worldwide, have focused attention on this area. Particularly troubling are indications that the interests of corporate management were, in a number of cases, profoundly misaligned with those of shareholders. This arguably contributed to sharp losses in equity markets and to a more generalized loss of confidence in capital markets globally.

Financial statements have historically been an essential means of providing information to investors. Doubts about the validity of these statements can undermine investor confidence and lead to a higher cost of capital, which reduces the economy's productivity.

As a recent task force committee sponsored by the International Federation of Accountants (IFAC), and chaired by former Bank of Canada Governor John Crow, reported, "Almost all the high-profile failures are the result of failures in business, failures in governance, and failures in reporting. The business issue that should be communicated to users of the financial statements is not properly disclosed, governance structures fail to prevent or detect this, and a reporting failure results. As an entity moves closer to business failure, the incentive to distort reporting increases and, therefore, the chance of reporting failure increases" (IFAC 2003, 5).

It has been noted that during the period of overheated equity markets in the late 1990s, pressures to push share prices ever higher often took precedence over proper governance and disclosure practices. Executive compensation increasingly based on the granting of stock options added to these pressures. This environment created the conditions for the high-profile corporate frauds.

These extreme cases generated tremendous pressures for reform in the United States, which culminated in the passage of the landmark Sarbanes-Oxley Act (July 2002). Among the most far-reaching legislative reforms to affect the U.S. corporate sector, it sets extensive new standards—from governance and accounting practices to reporting deadlines, ethics codes, and penalties for altering corporate documents.

Given Canada's relatively small markets and high degree of integration with U.S. capital markets, Canadian authorities have endeavoured to react in a way that acknowledges U.S. developments while accommodating the unique features of our corporate sector and financial markets—in essence, arriving at a "made in Canada" solution. Complicating this process has been the fact that U.S. regulation has traditionally emphasized the application of detailed rules, whereas in Canada the emphasis has been on the development of overarching principles to which practices should broadly conform.

Recent reform efforts in Canada have involved the co-operation of the federal and provincial governments, regulators, and the private sector. The Department of Finance (2003) has broadly categorized the Canadian reforms to date as

- strengthening corporate governance and ensuring management accountability,
- improving financial reporting and disclosure,
- enhancing the credibility of the audit process, and
- strengthening enforcement.

The proposed changes are aimed at building confidence while keeping compliance costs manageable. In this article, some issues in each category are highlighted.

## Strengthening Corporate Governance and Ensuring Management Accountability

Corporate governance can be broadly thought of as the way in which directors and managers handle their responsibilities towards shareholders.

Concerns about governance come to the fore only when there is a separation of ownership from control, which happens exclusively in the corporate form of business organization.<sup>1</sup> This separation can give rise to what is referred to as the “agency problem,” that is, the risk that the managers (the agents) of the firm will make decisions in their own interests rather than in the interests of the shareholders (the principals). In the extreme, such behaviour, if unchecked, can threaten the viability of the firm. To mitigate this problem, shareholders elect directors to the board who, in turn, appoint managers and hold them accountable.

### Who sets corporate governance standards in Canada?

In Canada, rules and guidelines related to governance originate from a number of sources. Federally incorporated companies are subject to provisions in the Canada Business Corporations Act (CBCA), and provincial companies are subject to the various provincial business corporation acts. In addition, public corporations are subject to provincial securities laws and stock exchange requirements, if applicable.

Regulated financial institutions may be subject to additional standards. For example, in January 2003, the Office of the Superintendent of Financial Institutions (OSFI) released a new guideline with respect to corporate governance for federal financial institutions. It should also be noted that in 2001, the Canada Deposit Insurance Corporation (CDIC) updated and modernized its *Standards of Sound Business and Financial Practices*.<sup>2</sup>

1. The other major business categories are single proprietorships and partnerships, where there is no distinction between ownership and control.
2. These Standards for CDIC members (which include all federally regulated institutions that take retail deposits) are a codification of practices at the best-run deposit-taking institutions.

Over the last decade, there have been several prominent public reviews of the quality of governance in publicly held corporations in Canada. These have generally provided assessments and suggestions for improvement.<sup>3</sup> Most recently, the Senate Standing Committee on Banking, Trade and Commerce released a report (2003) that addresses the various dimensions of the recent crisis of confidence in financial markets (of which corporate governance is one aspect) and makes wide-ranging recommendations. Much useful work was done through this period although, for the most part, proposed reforms have remained voluntary for public corporations.

### The thrust of recent board reform

In the aftermath of the recent high-profile corporate scandals, the need for reform in corporate governance has taken on much greater urgency. Not surprisingly, given the number of apparent board failures, considerable focus has been on reforming boards and making them more accountable and more independent.

In the United States, proposed measures introduced by the major stock exchanges (expected to receive final approval from the Securities Exchange Commission for a phased introduction) will lead to a requirement that boards be composed of a majority of independent directors. In addition, board committees that are generally considered to be the most important—audit, compensation, and nominating—are to consist exclusively of independent directors and to be subject to additional rules.<sup>4</sup> Under the proposals, independence is defined strictly and

3. For example, in 1994, the Toronto Stock Exchange created a committee under Peter Dey (a former head of the Ontario Securities Commission), which made 14 recommendations for best practices, focusing on the board of directors and its relationship with shareholders and management. In 1998, the Senate Standing Committee on Banking, Trade and Commerce produced a report (The Kirby Report) that focused on the governance practices of institutional investors. In 2000, the Joint Committee on Corporate Governance, chaired by Guylaine Saucier, was created. Its final report proposed modifications to the Dey recommendations in light of trends in globalization.
4. For example, for audit committees there would be new rules related to the financial expertise of committee members and how frequently committees must meet.

excludes all those individuals with a material financial relationship to the company, as well as family members and former employees. In terms of prior relationships, an extended “cooling-off period” (likely to be five years) has been established as a condition for achieving independent status.

In Canada, the process of board reform has intensified. Of course, many of Canada’s largest corporations are interlisted in the United States and will have to comply with many of the new U.S. standards if they wish to have continued access to U.S. capital markets. Meanwhile, after more than a year of debate and review, many Canadian companies have been carrying out internal reforms in areas such as committee composition, board practices, and compensation policies (McFarland 2003). *The Globe and Mail* recently surveyed 207 of the largest public companies in Canada, assigning scores for a range of factors related to good governance. It found that over the year, scores improved for two-thirds of the companies in the sample (McFarland and Church 2003).

Pressure for governance reform is also coming from other fronts. For example, in June 2002, major Canadian institutional investors established the Canadian Coalition for Corporate Governance, a vehicle for sharing information and working towards better governance practices. In August 2003, the Coalition published guidelines. In September 2002, the Canadian Council of Chief Executives released a statement outlining actions that they felt chief executive officers (CEOs) and boards of directors could take to strengthen corporate governance.

Doubts have been expressed about the appropriateness of the new U.S. standards for all Canadian firms. Canada has a different corporate structure than the United States, with a relatively larger proportion of small public firms and firms controlled more narrowly (by families and others) as opposed to being widely held. It has also been argued that the proposals for independent directors are too onerous for small firms—the argument being that they would not be able to attract enough qualified independent directors—and are not reasonable for narrowly controlled (family) firms. This has led some to advocate the notion of “two tiers” of governance standards in Canada, with less-stringent standards being applied to small firms.

At this point, the reform of governance standards is still a work in progress. One step occurred in June 2003 when 12 of Canada’s 13 provincial and territorial securities regulators published new draft rules for public companies that

- prescribed the role and composition of audit committees, and
- required the CEO and chief financial officer (CFO) to certify annual and interim disclosures.

Companies listed on the TSX would be required to have audit committees that are fully independent and financially literate. By contrast, smaller companies listed on the TSX Venture Exchange and unlisted issuers would be required to disclose only those audit committee members who are independent and financially literate.

In addition, a “certification rule,” applicable to all public companies, will require CEOs and CFOs to attest to the accuracy of their company’s financial statements and to disclose the effectiveness of their internal controls.

The TSX has also promoted the adoption of new corporate-governance standards. In September 2002, the TSX proposed changes to its voluntary guidelines and listing requirements to reflect new views on best practices. As a result of the investor-confidence measures proposed by securities regulators, amended proposals are expected.

Similarly, specific proposals are being prepared that would result in revisions to the governance provisions in the federal CBCA and to statutes governing financial institutions.

## Financial Reporting and Accounting Standards

A key dimension of proper corporate governance is adequate and sufficient financial reporting. As noted by the recent Report of the Senate Standing Committee on Banking, Trade and Commerce (2003), “A lack of financial transparency is an important issue for every stakeholder, including shareholders, investors, lenders, and auditors.”

## The standard-setters

In Canada, supervision of financial reporting involves a number of regulatory, self-regulatory, and oversight bodies. In terms of legislation, the federal CBCA, as well as provincial corporation acts and provincial securities acts, requires that companies prepare financial statements in accordance with Generally Accepted Accounting Principles.

The Accounting Standards Board (AcSB) of the accounting industry association, the Canadian Institute of Chartered Accountants (CICA), sets accounting standards. Public oversight of the AcSB is provided by the Accounting Standards Oversight Council, which consists of a mix of individuals from both within and outside the accounting profession.

## Accounting standards

Generally Accepted Accounting Principles—or GAAP—are a set of standards intended to bring clarity and uniformity to the financial reporting of corporations.

Traditionally, Canadian GAAP has been more principles based and judgment driven, and U.S. GAAP has been more rules based, although both systems encompass rules and principles. The International Accounting Standards Board is promoting the development of global uniform accounting standards that tend to rely more on principles. The U.S. Financial Accounting Standards Board is participating in this initiative. Canadian standards, while continuing to be strongly influenced by those in the United States, will likely be affected by international efforts aimed at greater harmonization.<sup>5</sup>

Important changes to Canada's accounting standards, designed to improve disclosure, are coming into effect. These include

- guidance on speculative derivatives that was brought into effect for fiscal years starting in July 2002;
- a new guideline requiring the disclosure of financial guarantees, which came into effect on 1 January 2003;

- a new guideline for variable-interest entities, which will come into effect by January 2004; and
- a draft guideline on the expensing of stock options, which is expected to come into effect by January 2004.

## Enhancing the Credibility of the Audit Process

The recent failures in corporate governance were often associated with breakdowns in the integrity of the audit process. This, in turn, has triggered a global re-examination of the external audit function. The growing importance of the consulting services that audit firms provide to their corporate clients has come under particular scrutiny. In certain cases, this may have compromised the objectivity of the audit process.

In Canada, the audit firm is appointed, in principle, by the shareholders—often with the guidance of the board's audit committee. Overall, Canadian audit practices follow a self-regulatory framework. Auditing and assurance standards are set by the Assurance Standards Board under the aegis of the CICA. The Board sets Generally Accepted Assurance Standards. In October 2002, the CICA announced the establishment of the Auditing and Assurance Standards Oversight Council, an independent body to oversee the setting of auditing standards; this body began to operate earlier this year.

Standards relating to public practice, such as auditor-independence rules and professional codes of conduct, have been developed by provincial institutes or associations of professional accountants for application to their members.

One important regulatory development has been the creation of The Canadian Public Accountability Board (CPAB), which is chaired by former Bank of Canada Governor, Gordon Thiessen. The mission of the CPAB, which was announced in 2002, is to contribute to public confidence in the integrity of financial reporting of Canadian public companies by promoting high-quality, independent auditing. The new agency, which aims to ensure both independence and transparency, means that auditors of

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5. Harmonization does not necessarily imply adopting U.S. or other rules verbatim but rather capturing the essence of their intent using a Canadian format.

Canada's publicly listed companies will be subject to more frequent and rigorous reviews.<sup>6</sup>

With regard to the important issue of auditor independence, the CICA released a draft independence standard in 2002 to apply to Canadian auditors and other assurance providers. According to the CICA, "the core principle of the new standard is that every effort must be made to eliminate any real or perceived threat to the auditor's independence" (CICA 2002). Among the issues addressed in the independence standard are which categories of non-audit services provided by an auditing firm to a corporate client are acceptable, as well as requirements for auditor rotation.

## Strengthening Enforcement

Considerable action has been taken to strengthen Canada's enforcement framework. In the 2003 federal budget, the government announced a coordinated national approach to enforcement aimed at strengthening the investigation and prosecution of serious corporate fraud and illegal market activity. Up to \$30 million a year has been provided for this coordinated approach, which includes

- Legislative amendments to the Criminal Code to create new offences (e.g., improper insider trading) and evidence-gathering tools to increase penalties, to provide guidance on sentencing, and to establish concurrent jurisdiction with the provinces in the prosecution of serious cases of capital market fraud
- New resources dedicated to investigating serious cases of capital market fraud—special teams of investigators, forensic accountants, and lawyers will be established in key Canadian financial centres

- New resources to support the prosecution of capital market fraud offences under the Criminal Code (including cases generated by the special investigative teams)

At the provincial level, governments have bolstered the enforcement framework for securities laws. For example, Ontario and Quebec have passed legislation to modernize the definition of securities offences, increase penalties, and broaden the investigative powers of their securities commissions.

On 12 November 2003, the Canadian Securities Administrators (CSA) announced that they had received a report from the Illegal Insider Trading Task Force. The report recommends practices to address illegal insider trading in Canadian capital markets.<sup>7</sup> The recommendations focus on addressing the problem from three directions: prevention, detection, and deterrence. The CSA stated that it will consider the recommendations as it develops an action plan to address the problem of illegal insider trading.

## Conclusion

Numerous initiatives have been taken with respect to corporate governance, accounting, and auditing standards in Canada. While more remains to be done, it should be remembered that such regulatory changes are not costless for businesses (which are subject to the increased reporting and governance standards). It is therefore important that the authorities try to achieve the desired goals with minimum effect on efficiency. To ensure that these measures will serve Canada well in the years to come, it will be essential to rigorously assess the reforms implemented.

6. CPAB's five-member Council of Governors is made up of the: Chair of the Canadian Securities Administrators, the Chairs of two provincial securities commissions (the Ontario Securities Commission and the Commission des valeurs mobilières du Québec), the Superintendent of Financial Institutions, and the President and CEO of the Canadian Institute of Chartered Accountants. It should be noted that a draft rule by 12 of Canada's 13 provincial and territorial securities regulators, published in June 2003, requires auditors of public firms to be members in good standing of the CPAB.

7. The Illegal Insider Trading Task Force was established in September 2002 and included representatives from the Ontario, Quebec, British Columbia, and Alberta securities commissions, the Investment Dealers Association of Canada, the Bourse de Montréal, and Market Regulation Services Inc.

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# Transparency in the Canadian Fixed-Income Market: Opportunities and Constraints

*Tran-Minh Vu*

**M**arket quality is important to policy-makers because it directly affects the level of confidence and the willingness of participants to use markets for transactions. Factors such as informational efficiency, volatility, liquidity, and transparency can all affect market quality (Boisvert and Gaa 2001).

The Bank of Canada has a particular interest in the quality of fixed-income markets because of its roles in promoting a safe and efficient financial system, formulating and implementing monetary policy, and managing the federal government's debt. Liquid, orderly, and resilient markets support the financial system's ability to allocate resources effectively, the Bank's ability to rely on the efficient transmission of changes in the overnight interest rate across the term structure of yields, and the government's ability to achieve stable, low-cost financing.

This article focuses on one aspect of market quality—transparency. The Bank, the Department of Finance, and others have promoted enhanced transparency in fixed-income markets for some time.

## Market Structure and Transparency

Market transparency is usually defined as the ability of market participants to observe the information in the trading process (O'Hara 1995).

In general, the level of transparency differs across different market structures. Its evolution has been influenced by the nature of the instruments traded, the interactions between market participants, and, in some instances, by rules established by public authorities. For example, fixed-income markets are distinct from equity markets in a number of ways. Most equity

markets are centralized, order-driven markets, whereas fixed-income markets, where dealers intermediate customer transactions by providing quoted prices, are typically decentralized and quote driven. The frequency of transactions is lower in fixed-income markets than in equity markets; however, the average size of each trade is much larger. Fixed-income markets are generally wholesale markets, dominated by sophisticated institutional investors. Retail investors are more active in equity markets. These characteristics have contributed to the decentralized nature of fixed-income markets, where retail participants have less access to price information than they do in centralized markets, such as the equity market. Participants in fixed-income markets generally demand greater immediacy of trade execution than those in equity markets.<sup>1</sup> Dealers undertake the immediate trade and then proceed to manage their inventory through subsequent trades.

In fixed-income markets, transparency refers mainly to information regarding pre-trade quotes and post-trade reporting of prices and volumes. More specifically, pre-trade quotes refer to the availability of information about bids and offers, and post-trade reporting refers to the public and timely transmission of information on past trades, which may include price, volume, and execution time (BIS 2001).<sup>2</sup>

Equity markets have evolved in a heavily regulated environment, and much of the practical and theoretical knowledge of market regulation has developed around these particular

1. Demand for immediacy depends on the volatility of the security and the diversifiability of the risk of an adverse price movement. Therefore, the greater the risks that investors face in delaying their trades, the greater the desire for immediacy of trade execution.
2. Note that price information may also be displayed as a yield or a spread against a benchmark.

markets. A wide body of literature supports the argument that greater transparency in the trading process enhances market liquidity and efficiency by reducing opportunities for taking advantage of less-informed or non-professional participants.<sup>3</sup> This has led regulatory authorities to require that equity-trading information be made immediately available to the general public. However, the type of transparency regulation appropriate for equity markets may not be appropriate for fixed-income markets. While the issue of asymmetric information (where a subset of market participants have private knowledge of an asset's expected value) may apply to equity markets, it may be less of an issue in fixed-income markets for government securities. Gravelle (2002) finds that private information about the expected value of government securities plays only a minor role in the market (if any), since their prices depend on the term structure of yields which, in turn, depend on macroeconomic factors that are public information.

### **The effects of increased transparency**

Generally, a market becomes more transparent when there is an increase in trade information available to the public. It is assumed that greater transparency would likely increase market liquidity by building up the confidence of participants. Moreover, a higher level of pre-trade transparency would encourage customers to manage their portfolios more actively and would attract new investors to the market. A higher level of customer participation would not only increase the level of liquidity, but would also add to the ability of dealers to provide liquidity to the markets by reducing their market-making cost.<sup>4</sup>

In Canada, because of the decentralized nature of the fixed-income market, customers typically contact several dealers to obtain the best price.<sup>5</sup>

3. A liquid market is generally defined as a market where participants can rapidly execute large-volume transactions with only a small impact on prices (BIS 1999).
4. Increased customer participation could help dealers to manage part of their inventory risk by increasing the frequency of their trading with their own customers.
5. Because they are primarily institutional investors, customers usually have a fiduciary duty to obtain at least three quotes from different dealers.

Increasing pre-trade transparency would not only contribute to more efficient price discovery, but would also help customers obtain the best execution of their transactions.

It is increasingly recognized by participants and researchers that, at some level, a trade-off exists between increased transparency and liquidity. For example, participants who responded to the Investment Dealers Association of Canada (IDA) and the Canadian Securities Administrators (CSA) *Market Survey on Regulation of Fixed Income Markets* (Deloitte & Touche 2002) agreed that steps taken to increase transparency should also consider the impact of such steps on liquidity. On balance, however, the literature is still inconclusive about the effect of greater transparency on overall market quality (Allen, Hawkins, and Sato 2001).

While increased transparency benefits the market as a whole, full transparency may not always be optimal. This is particularly true if dealers are required to display information on large-volume trades in real time (i.e., full post-trade transparency) to the market. For example, such a dealer will incur greater costs for managing inventory risk, since other dealers, who have been informed about the direction and size of the trade in real time, will strategically adjust their quotes in the interdealer market.<sup>6</sup> Full post-trade transparency would hinder the ability of dealers to manage their inventory risk, thereby reducing their incentive to provide liquidity to the market. Ultimately, dealers might pass on these higher risk-management costs to their customers by widening the bid/ask spread and providing less depth to the market.

### **How transparent are Canadian fixed-income markets?**

The IDA/CSA *Market Survey on Regulation of Fixed Income Markets* (Deloitte & Touche 2002) states that "price transparency varies depending on the type of security and on the type of market participant." Respondents to the survey indicated that government securities have good price transparency, while illiquid securities are less transparent. However, the survey

6. Dealers use the interdealer fixed-income market not only as a price-discovery mechanism, but also as a means of sharing with other dealers the position risks that they have taken on while trading with customers.



shows that customers in the *retail* sector have very little access to price information.

Market participants (i.e., institutional, wholesale investors) can currently obtain information on debt securities via CanPX.<sup>7</sup> CanPX is a system for reporting quotations and trades and is designed to provide a consolidation of interdealer prices to all interested market participants. By logging on to CanPX, participants can have access to the best bids and offers in the interdealer market.

Moreover, participants have access to price information by calling dealers for quotes and also to indicative quotes via service providers (e.g., Bloomberg). The recent development of alternative trading systems (ATs) in Canada gives participants access to quotes from a number of dealers through these systems. Therefore, ATs have the potential to increase transparency in fixed-income markets.

## Changing Technology: An Opportunity for Increased Transparency

While the last few years have seen the rapid emergence of electronic trading systems in securities markets, their penetration has been uneven. Distinctive market structures have led to slower development of electronic trading in fixed-income markets than in equity or foreign exchange markets.<sup>8</sup> On a cross-country comparison basis, electronic trading has been slower to develop in the Canadian fixed-income market than in U.S. or European markets. This may be partly explained by the varied needs and incentives of market participants, as well as by the regulatory and competitive factors present in each country. The relatively smaller size of Canadian markets and the degree of concentration, coupled with the high cost of technological infrastructure, may also be factors behind the slower development of electronic trading in Canada.

7. CanPX was developed by IDA member firms and interdealer brokers. It began operating in Canada in 1999 and is similar to the GovPX system in the United States.

8. Asset type is also an important element in the development of electronic trading, since standardized, homogeneous products have proved the easiest to migrate to electronic trading platforms.

## The impact of electronic trading systems

Electronic trading systems have already affected the functioning of fixed-income markets in many ways, particularly in the United States and Europe. First, they can facilitate greater pre-trade and post-trade transparency. In fact, the most commonly cited benefit of electronic trading systems is that they can enhance the price-discovery process and help establish best prices. Second, electronic trading can be more cost-efficient, especially with its capability for straight-through processing. Third, these systems alter the relationship between dealers and customers. For example, customers can obtain quotes from several dealers almost instantaneously without having to contact each dealer. The introduction of a customer-to-customer system (bypassing the intermediary role of dealers) could affect the structure of the fixed-income market by removing the current separation that exists between the interdealer sphere and the dealer-customer sphere.

## Reporting quotations and trades

The CanPX system provides further price transparency for the Canadian fixed-income market by consolidating price information. At this stage in its development, its coverage is limited to benchmark government securities and a relatively narrow number of corporate securities traded in the domestic marketplace. The Deloitte Report (2002) indicates that responses to CanPX have been mixed. On one hand, institutional investors and issuers commend CanPX for increasing the level of price transparency in the markets. On the other hand, large dealers are skeptical about the quality of the information displayed on CanPX because it is limited to a minimum trade size, whereas prices usually vary with the size of the order.

## Improving market quality

Electronic trading systems and systems for reporting quotations and trades are welcome additions to the Canadian fixed-income market. Although some of these systems are still in their early developmental stages, they have the potential to enhance current levels of transparency. By enhancing transparency, electronic trading systems will add to market quality, because trading transparency contributes to reliable

price discovery and efficient risk-allocation between market participants.

## The Canadian Public Policy Response

Canadian provincial securities regulators are actively involved in regulating electronic trading systems. In December 2001, the ATS Rules came into effect in Canada.<sup>9</sup> The primary purpose of the ATS Rules is to establish a new framework that allows ATSs to compete with more traditional exchanges. The regulatory objectives are to provide investors with more choices, decrease trading costs, and improve price discovery and market integrity. The ATS Rules are divided into three parts: (1) a framework for the regulation of marketplaces, (2) requirements for data transparency and market integration, and (3) rules for market regulation.<sup>10</sup> The requirements for data transparency are divided into two categories: (a) exchange-traded securities and foreign-exchange-traded securities, and (b) debt securities.

According to the current ATS Rules, transparency requirements for debt securities have been separated into two subcategories: government debt securities and corporate debt securities. For government securities, marketplaces and interdealer brokers (IDBs) must provide real-time order and trade information on designated benchmarks to an information processor (full pre-trade and post-trade transparency).<sup>11</sup> For corporate securities, marketplaces are required to provide real-time order information to an information processor. The reporting of trade information for corporate securities is, however, subject to volume caps and a time delay.<sup>12</sup>

9. The CSA's ATS Rules consist of National Instrument 21-101 Marketplace Operation (NI 21-101), National Instrument 23-101 Trading Rules (NI 23-101), and the related companion policies (21-101CP and 23-101CP).
10. Marketplaces are exchanges, as well as systems for reporting quotations and trades, including ATSs. They do not include interdealer brokers.
11. The ATS Rules define an information processor as any person or company that receives and provides information under the NI 21-101 and has filed Form 21-101F5.
12. More specifically, marketplaces, IDBs, and dealers executing trades outside of a marketplace must provide trade details within one hour after the trade, subject to volume caps of \$2 million and \$200,000 for investment-grade corporate securities and non-investment-grade corporate securities, respectively.

The CSA granted fixed-income ATSs an exemption from transparency requirements until 31 December 2003. In October 2003, the CSA released a notice of amendments to the ATS Rules. Under the amendments, all transactions in government securities would be granted a three-year exemption from the transparency requirements, while transparency requirements for corporate securities would be implemented as planned. The CSA indicated that the three-year period will allow market participants to determine the appropriate level of transparency for government fixed-income markets. The CSA have also recommended CanPX as an information processor for corporate debt securities.<sup>13</sup>

## Views on the ATS Rules

The Bank, together with the Department of Finance, has been participating in the development of the ATS Rules since 1999, and has provided comments on the potential repercussions of the Rules on the maintenance of well-functioning fixed-income markets. While greater transparency is generally supported, our perspective has been that transparency requirements be designed so as to not adversely affect the price-discovery mechanism or market liquidity.

Throughout this period, in interactions with the CSA and the Bond Market Transparency Committee (BMTTC), the importance of developing appropriate levels of transparency on a consultative basis has been stressed.<sup>14</sup> While transparency should increase, especially in the retail sector, measured steps should be taken when increasing transparency so as not to disrupt the efficient functioning of the wholesale fixed-income market. This sentiment is shared by the market participants who responded to the Deloitte & Touche survey.

One consideration is the need for an equitable, but appropriately differentiated, regulatory framework, recognizing similarities and differences in market structures. More specifically, it

13. CanPX was named information processor for corporate securities by the provincial securities commissions in September 2003.
14. The BMTTC was established by the CSA to examine the levels of transparency appropriate for Canadian debt securities. The BMTTC was designed to include, as much as possible, representatives from all segments of the fixed-income market.

has been suggested that fixed-income ATSs and marketplaces that are similar in nature should be subject to the same transparency requirements. As such, systems displaying executable prices should have the same level of transparency as IDBs, which are also characterized by this feature. Furthermore, the Bank and the Department of Finance have expressed confidence that IDBs and systems displaying executable prices should be able to support a higher level of transparency than systems displaying indicative prices.

When the amendments come into effect in early 2004, transactions in *corporate debt securities* will be regulated by the ATS Rules. But the CSA have indicated that it is premature to impose transparency requirements in the *government debt* market. One would expect that government securities, which are the most liquid of Canadian fixed-income securities, could support a higher level of transparency than corporate debt securities and support it sooner rather than later.

## What's Next?

The Bank will continue to work in collaboration with the Department of Finance, the CSA, and the BMTC to promote increased transparency in a way that recognizes the unique characteristics of fixed-income markets.

In February 2004, the Bank will host a workshop on regulation and transparency in fixed-income markets. The workshop will bring together academics, regulators, and market participants to examine and analyze issues related to transparency and market quality. This will further inform our work to enhance the efficiency of the Canadian fixed-income market.

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# Policy Issues in Retail Payments

*Sean O'Connor*

**T**he retail payments system is critical to commercial activity in Canada. Broadly defined, it has many components, including payment instruments, information technologies, and funds-transfer processes that involve a range of institutions. Each institution specializes in particular services required to initiate or settle a retail payment obligation. Retail payments are obligations arising from retail commercial and financial transactions between individuals and businesses and from transfers between them and governments.

Everyone is familiar with the various retail payment instruments, such as cash, cheques, and credit cards. The infrastructure arrangements for processing these instruments and for transferring the associated funds are less well known, but their efficient and reliable operation drives the retail payments system.

This note highlights some of the policy issues and initiatives that are emerging in retail payments systems, especially those affecting the infrastructure arrangements.<sup>1</sup> Some of these issues are being addressed by private and public sector organizations, while others are just beginning to emerge. To provide some context for discussing these issues, a brief overview of the organization of the retail payments system in Canada and of key developments that have given rise to these issues is necessary.

## Retail Payment Infrastructure

The principal system for clearing and settling retail payments in Canada is the Automated Clearing Settlement System (ACSS) operated by the Canadian Payments Association (CPA). CPA members are the financial institutions that provide payment accounts, instruments, and services to individuals and businesses. The CPA

### Infrastructure Systems

The infrastructure systems for payments provide transaction, clearing, and settlement services to their participating members.

Transaction systems use information and communication technology to deliver payment instructions between the parties to a transaction and their financial institutions. Their services include

- verifying the identity of the parties and their ability to pay;
- validating the payment instructions; and
- communicating information between the parties and their financial institutions.

Clearing systems exchange payment information between the financial institutions that settle their customers' payment obligations. They also calculate each institution's (clearing member's) settlement claim or obligation. Clearing services include

- sorting and matching transactions between member institutions;
- calculating members' settlement positions; and,
- transmitting the data to the individual member institutions and to the settlement bank.

Settlement systems transfer funds between deposit accounts that the clearing members hold at the central bank or at another depository. Settlement services include

- verifying interbank funds-transfer positions and the funds available in the paying institution's settlement account;
- settling obligations by posting the funds transfers to the institutions' settlement accounts; and
- confirming the completed settlement with the account holders.

1. For a more detailed description, see O'Connor (2003).

clears a variety of retail payment instruments through the ACSS daily. It nets the value of all these payment instruments, multilaterally across all direct participants, into a single settlement payable or receivable for each participant. These settlement positions are discharged through transfers across the settlement accounts held at the Bank of Canada by the direct participants in the ACSS.

There are also other clearing and settlement systems for retail payments in Canada. The major credit card organizations and some Internet payment schemes operate their own clearing systems and settle their payment obligations through accounts held at commercial banks. Most are associated with a shared or common-use transaction system. Some are operated by non-bank Internet payment providers.

The most established transaction systems are ATM, debit-card, Internet, and tele-banking systems owned and operated by the major Canadian financial institutions. The proprietary ATM and debit-card systems are typically linked nationwide through Interac into the largest of the common network arrangements. Payments made through Interac are cleared and settled through the ACSS.

## Developments in Retail Payments

Two principal factors underlie the changes in retail payments in recent years:

- Innovations in information technology that involve new payment applications, and
- Changes in financial sector policy aimed at improving competition and efficiency in financial services, including payment services.

The most noteworthy effects of these developments on retail payments have been:

- A shift towards electronic payments and away from cheques. This has been most pronounced with respect to card payments and reflects the relatively low costs and risks associated with these instruments, as well as the immediacy of payment.
- A trend towards outsourcing of payment processing and transaction services. This allows financial institutions to tap into common, shared networks and systems to reduce

costs for payment service and improve the quality of service.

- The separation of clearing and settlement systems for wholesale (large-value) and retail payments. This has permitted the CPA to initiate changes that will make the ACSS more cost-efficient for its participants.
- A relaxation of regulatory constraints on access to infrastructure systems and the provision of service in retail payment markets.

These developments present challenges to existing public and private sector policies regarding the operations and services of infrastructure systems for retail payments.<sup>2</sup>

## Issues and Initiatives

The key issues that have begun to emerge in retail payments systems as a result of these changes can be grouped into

- infrastructure arrangements and services,
- payment technologies and applications, and
- market access and competition.<sup>3</sup>

### Infrastructure arrangements

#### *Direct participation in the ACSS*

Two issues have emerged with respect to the structure of the ACSS. The first deals with the conditions for direct participation in the system. The Canadian Payments Act of 2001 extended access to include life insurance companies, securities dealers, and money market mutual funds. Direct participation is, however, subject to conditions regarding the minimum volume of payments cleared through the system, the type of institutional class to which a member belongs, and access to ACSS settlement facilities at the Bank of Canada. CPA members are concerned that these conditions may no longer be the most appropriate for direct participation in the ACSS, although some members are concerned that eliminating all conditions could impose significant costs and risks on the system.

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2. For a more comprehensive description of retail payments systems, see Committee on Payment and Settlement Systems (1999 and 2000).
  3. Some issues are shared by other countries. See Committee on Payment and Settlement Systems (2003).

As part of its ACSS settlement facility, the Bank of Canada provides overnight credit to direct participants. The Bank is concerned that it may be difficult to cover its credit exposures with a valid, first-priority, security interest for some of the classes of institutions newly eligible to participate in the ACSS. Some institutions are governed by pledging restrictions and bankruptcy regimes that could expose the Bank's security interest to stays on execution. Consequently, the Bank has been examining workable options for providing access to settlement facilities to all classes of institutions in the CPA. The fact that the net obligations of the ACSS are now settled through the Large Value Transfer System (LVTS) could help resolve this issue. With this method of settlement, the Bank will no longer need to extend overnight credit to settle positions in the ACSS. A legally valid security interest in collateral pledged to the Bank for these LVTS payments will be protected from stays on execution under the Payment Clearing and Settlement Act.<sup>4</sup>

The second issue is related to tiered participation in the ACSS. Only a few direct participants in the ACSS act as clearing agents for the indirect participants in the system. In doing so, they effectively operate their own clearing and settlement systems (called quasi-systems) within the ACSS. There is some concentration of settlement risk within these quasi-systems, but their risk-management controls are not transparent. The untimely failure of one of the principal clearing agents, or of a major indirect clearer, could disrupt settlement in the ACSS and cause repercussions for participants and their clients.

The CPA, the Bank of Canada, and the Department of Finance have established a joint study group to examine these issues and report their findings by next year.

#### *Retail payments and the LVTS*

Although the LVTS handles the majority of large-value payments cleared through the CPA, some large-value retail payments are still cleared and settled through the ACSS. Even though these payments are extremely unlikely to create systemic risk in the ACSS, the individual payments themselves are still open to settlement risks that are not present in the LVTS. Recently, the CPA established a maximum limit of \$25 million for individual cheques eligible

for clearing and settlement through the ACSS. This initiative is expected to reduce financial risk for ACSS participants and their clients.

There has been a proposal to impose the same limit on electronic payments that clear and settle through the ACSS. At issue is whether the risk reduction would be cost-effective for the participants in the ACSS and their clients.

#### *Cross-border retail payments systems*

With projections that the volume and value of cross-border retail payments will continue to grow, the development of centralized clearing systems that specialize in cross-border retail payments is again under review in some countries. Earlier proposals and programs for multilateral cross-border systems failed because of a weak business case related to relatively low values and volumes and the investments already made in well-established, decentralized bilateral correspondent banking arrangements. Some small multilateral systems do still exist, however. There has also been a recent initiative to develop a new multilateral system for clearing cross-border retail payments in the euro system. A proposal to link it with non-euro systems for clearing cross-currency payments, might encourage Canadian financial institutions to re-examine their business case for participation.

#### **New payment technologies**

The development of low-cost Internet communications has increased the commercial incentives for remote transactions and for making payments over multiple-user, open-network systems, such as the World Wide Web. Two key issues here are the security of payment information in these systems and authentication of the identity of the transacting parties. Private and public entities, such as the major credit card companies, the Canadian Payments Association, and Industry Canada, are spearheading the development of secure electronic information and storage technologies to resolve these issues. Legislation to protect privacy and to validate electronic documents and signatures has also recently been enacted.

As these technological and legal initiatives continue to build, related commercial issues still need to be resolved. Among these are the questions of interoperability of equipment, software, and operating standards for the

4. See Tuer (2003) for details on the settlement process.

infrastructure arrangements of rival Internet payment schemes. Also at issue is their compatibility with complementary services such as payment, clearing, and settlement.

There are also issues regarding the legal foundation for new forms of electronic payment applications. Principal among these is cheque truncation. Paper cheques would become digitized at the receiving institution so that the physical cheque would no longer need to be transferred back to the paying institution. Hence, the cost of clearing and settlement would decline. The technologies are now well developed and available; the CPA is working on drafting procedures and standards for digitized cheques; and the Department of Finance has begun a review of legislative requirements.

### Market access and competition

Many recent legislative changes and regulatory efforts have been aimed at enhancing competition and efficiency in retail payments. The pressure for increasingly open access to infrastructure organizations raises questions about differential regulation among similar infrastructure systems and remote access to them.

While the operators and systems of some infrastructure arrangements, such as the CPA and Interac, are regulated in various ways, many emerging Internet payment schemes and credit card systems are not regulated in Canada. Consequently, there is a question concerning the ability of regulated and unregulated entities to compete evenly in the same service markets. There is also the issue of what objectives and criteria are appropriate for regulation of retail payments systems.

Because of legal and regulatory concerns about conflicts of law and regulatory authority across sovereign jurisdictions, remote participation—access to domestic infrastructure systems for institutions located outside Canada—is prohibited. However, financial institutions in Canada already acquire some transaction and clearing services for card payments from organizations located elsewhere. Also, the emergence of Internet banking provides a platform by which institutions located elsewhere could provide retail payment accounts, instruments, and services to Canadian residents. With the resolution of the legal and regulatory concerns, remote participation in the

infrastructure systems for retail payments could become more likely.

### Conclusions

To lower costs and avoid costly disruptions in retail commercial and financial transactions, retail payments systems are required to operate efficiently and reliably. Innovations and policy changes aimed at achieving this goal are underway, but they raise a number of policy issues for both the public and private sectors. Initiatives to resolve some of the significant issues described above are already underway, and some consideration of others by both private and public sector organizations is beginning. All organizations involved in retail payments share the same objective: to find the right balance between the need for efficiency, necessary risk controls, and consumer interests that best serves the evolving retail payments system.

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Research

Summaries



## Introduction

**B**ank of Canada staff undertake research designed to improve overall knowledge and understanding of the Canadian and international financial systems. This work is often pursued from a broad, system-wide perspective that emphasizes linkages across the different parts of the financial system (institutions, markets, and clearing and settlement systems). Other important linkages may include those between the Canadian financial system and the rest of the economy, as well as those with the international environment, including the international financial system. This section summarizes some of the Bank's recent work.

*Governance and Financial Fragility* examines, from a general cross-country perspective, the channels through which governance (broadly defined as the rules and institutions that govern economic activity) affects the stability of the financial system. There is a growing body of evidence that weak governance can contribute to periods of volatile financial activity and, in extreme cases, to a financial crisis. Specific aspects of governance that are most likely to contribute to the robustness of the financial system are identified.

Income trusts have experienced rapid growth as an investment vehicle for Canadians over the past several years. In *Income Trusts: Understanding the Issues*, the structure of this market is described, including factors that affect the valuation of income trusts.

The third article, *Valuation of Canadian- versus U.S.-Listed Equities: Is There a Discount?* examines to what extent the equity of firms listed on Canadian markets trades at a discount relative to that of comparable firms listed on U.S. markets. Although the authors present evidence indicating that there is indeed a discount, they conclude that further research will be required to fully understand its sources.

The Large Value Transfer System is one of Canada's key clearing and settlement systems. To support their payments activity in the LVTS, participants are required to pledge collateral. In *Excess Collateral in the LVTS: How Much Is Too Much?* the authors develop an approach to help determine whether the collateral held in the LVTS is consistent with a simple cost-minimization model. The results suggest that, in aggregate, this generally appears to be the case.



# Governance and Financial Fragility

*Michael Francis\**

**A**fter a period of financial turbulence during the last half of the 19th and the early 20th centuries, the world experienced relative stability. This was a period in which global financial markets were heavily regulated and controlled. As Allen and Gale (forthcoming) point out, reliance on such severe intervention came at the cost of economic efficiency. The subsequent period of financial deregulation, while contributing to efficiency gains, has also revealed weaknesses in many financial markets and has coincided with a period of financial instability around the globe. Authorities are consequently searching for the sources of financial fragility, in the hope of eliminating the costs associated with financial crisis without the burden of excessive regulation.<sup>1</sup>

This note examines the relationship between governance (the rules and institutions that govern economic activity) and financial fragility (a situation in which the willingness of creditors to finance investment opportunities is highly sensitive to shocks). Drawing upon evidence from the literature and new empirical research, the focus is on domestic financial markets. It is argued that governance can play an important role in improving the stability of financial systems by mitigating unnecessary fluctuations

in investment financing and reducing the likelihood of a systemic banking crisis.<sup>2</sup>

Note that the definition of governance used here is much broader than that of corporate governance alone. It is intended to capture the wider set of arrangements (i.e., rules and institutions) that support economic and financial activity.

## Governing Financial Relationships

Governance is increasingly cited as playing an important role in determining economic outcomes.<sup>3</sup> The reason is simple. In addition to relative prices, it is the system of governance that determines the set of incentives facing economic agents. While the price mechanism alone could be expected to guide agents to a good economic outcome if property rights were well defined and respected, these criteria may not be satisfied in many markets. This is especially true for financial markets where there are extreme asymmetric information problems between the borrower and creditor.

From a creditor's viewpoint, the lack of credible information about the behaviour of borrowers and their intentions to repay can lead to a situation in which a creditor may have no basis for believing that a borrower is committed to repaying. In such circumstances, creditors may be unwilling to supply credit to borrowers. To overcome problems like this, societies tend to develop rules and institutions that, among other things, act to align the incentives for

1. That financial crises can have enormous costs is well documented. For example, Honohan (1997) estimates that just the public sector costs of resolving banking crises in developing countries between 1980 and 1995 amounted to US\$250 billion. Other private economic costs include foregone investment and social costs.

\* This note draws on a recently published Bank of Canada working paper (Francis 2003).

2. This note is concerned with financial fragility. Although financial fragility is a widely used term, it is used here to describe the vulnerability of the banking system to a crisis (as in Mishkin 1997) and the magnitude of accelerator effects as described by Bernanke and Gertler (1989).

3. See, for example, IMF (2003).

borrowers so that they are committed to repaying creditors. Without a well-developed set of rules and institutions, financial development in an economy is likely to be poor.

Clearly, governance mechanisms, ranging from the absence of corruption through to specific laws such as those covering bankruptcy, can play an important role in fostering an environment where borrowers will commit themselves to repaying creditors (La Porta et al. 1998). However, governance mechanisms such as these have the complication of linking the provision of credit to the borrowers' commitment to repay rather than to the returns on investment.<sup>4</sup> Consequently, the value of a firm's assets and the quality of governance are important features of the financing decisions that firms take, and, thereby, are important for determining the aggregate level of credit provision and investment. Not surprisingly, one might also expect the quality of governance to affect the degree of financial stability.

## Financial Fragility

The view that governance is important for financial stability makes sense when it is acknowledged that if the quality of governance is poor, then the collateral value of assets determines the availability of financing for working capital and investment. In such a situation, because the value of a firm's assets may depend on the expected level of investment, a shock that reduces the willingness of lenders to extend credit can lead to a vicious circle in which the reduction in investment produces a fall in asset values resulting in a further reduction in the supply of credit and investment.<sup>5</sup> If the view that governance is an important factor in determining the magnitude of these "accelerator effects" is correct, then it follows that both financial systems and the level of investment are less stable in countries with

relatively weak governance than in those with relatively effective governance.

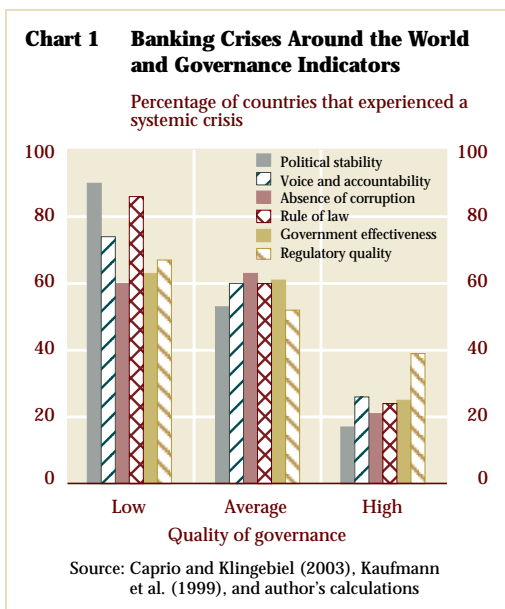
## Evidence

Financial fragility is difficult to quantify. At one level, it can be considered as the likelihood of a systemic failure in the financial system, while at a less dramatic level, it can be considered as the sensitivity of the financial system to relatively small shocks. With the first measure, the most obvious indicator of financial fragility is a systemic banking crisis. The most recent research on this topic suggests that pecuniary externalities (e.g., the collapse in market asset prices triggered by the failure of a borrower) are a fundamental part of the story behind systemic banking crises (Allen and Gale 2003). These externalities, and the associated accelerator effect, provide the mechanism through which a small shock involving one bank can lead to a sharp drop in asset values and, ultimately, to a systemic collapse. More generally, however, other measures, such as investment volatility, may also provide quantifiable measures of the size of these accelerator effects and therefore the extent of financial fragility. In either case, by reducing the magnitude of accelerator effects, good governance can be expected to mitigate financial fragility.

Chart 1 supports this view. The graph indicates that a significantly higher proportion of countries with poor governance experienced a banking crisis during the 1984–2001 period when compared with those countries having a higher quality of governance—a finding that holds across a wide range of governance indicators.<sup>6</sup> For example, 86 per cent of countries, where respect for the rule of law was ranked as low, experienced banking crises during the period, whereas only 24 per cent of countries experienced a crisis if respect for the rule of law was regarded as high. Interestingly, the relationship is true not only for those measures that are likely to be closely linked with protection of property rights, but also for other measures, ranging from the absence of corruption through to the quality of public service (government effectiveness) and the accountability of the government to the people.

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4. It should be noted that the credibility of the borrower's commitment to repay is conceptually different from the intrinsic risk associated with the investment project. The former is at the heart of the moral hazard problem and can be mitigated (at least partially) by appropriate governance, while governance can do nothing about the latter.
  5. For a theoretical development of accelerator effects in financial markets, see Bernanke and Gertler (1989) and Kiyotaki and Moore (1997) among others.

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6. The dataset consists of 90 developing and industrialized countries of which 47 experienced at least one crisis between 1984 and 2001.



Similarly, indicators of the quality of governance perform well in explaining the volatility of investment.<sup>7</sup> Using country-specific measures of investment volatility for a wide range of industrialized and developing countries over the period 1980 to 2000, one finds that countries with poor governance generally experience more volatility in investment than those with good governance. The results hold for a wide range of governance indicators and are consistent with the findings for the banking crises described above. These results suggest that, as discussed previously, governance has a role to play in reducing the size of accelerator effects.

## Conclusion

The findings presented here suggest that financial fragility can arise, in part, when there is a lack of appropriate governance to support a well-developed financial sector. While it is easy to understand that governance can affect economic outcomes, it is more difficult to determine which forms of governance promote financial stability. Nevertheless, the findings here, and those of the International Monetary Fund (2003), suggest the following criteria. First, institutions that protect property rights and promote law and order are important. Second, appropriate regulations, an effective bureaucracy, and a stable government are all associated with less fragility, suggesting that the quality of public service and good public sector management can play an important role in promoting economic stability. Third, to the extent that many of these institutions involve rules and constraints on individual behaviour (substituting authority for the market), it is not surprising that institutions that reduce corruption (the use of the market to circumvent authority) are also important for ensuring that financial markets are well functioning and stable. Fourth,

7. The volatility that this note is concerned with is not that which arises from adjustments to shocks, such as technological change, or from changes in relative prices. In a well-functioning economy, this type of volatility is a necessary and important element in the efficient allocation of resources. However, the accelerator effects described here are a source of volatility that arises because of market failures associated with problems such as asymmetric information in financial markets. Good governance can mitigate these problems and lead to a reduction in economic volatility and an improvement in economic efficiency.

it is perhaps not surprising that, given the important role that governments play in regulating and participating in financial markets, mechanisms that increase government accountability play an important role in creating a stable financial system.

From a policy perspective, the findings presented here suggest that financial stability around the world could be improved through continued attention to improving the institutional infrastructure within which domestic financial systems operate.

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# Income Trusts: Understanding the Issues

*Michael R. King\**

**A**n income trust is an investment vehicle that distributes cash generated by a set of operating assets in a tax-efficient manner. The sharp rise of income-trust valuations, the large supply of new issues, and the complexity of their legal structure have led to increased scrutiny of this asset class. To explore whether the cash returns from income trusts are in line with the risks, the structure of a typical income trust is compared with that of a typical corporate entity. The legal, regulatory, and governance issues introduced by these differences are then raised. Finally, business and market-related issues are discussed.

## Structure and Valuation

An income trust is a special-purpose entity that sells equity to the public in the form of units and uses the proceeds to purchase an operating company that holds a set of income-generating assets. Legally, income trusts are a subset of the broader category of “mutual fund trusts” within the meaning of the Income Tax Act (Canada). The term “income trust” may be used broadly to cover a variety of businesses and models, or narrowly to refer to a segment of this asset class. Here, it refers to royalty trusts, real estate investment trusts, and trusts based on various businesses (also called hybrid trusts or business-income trusts).

As an asset class, income trusts have experienced phenomenal growth over the past two years. Income trusts had a total market capitalization of \$45 billion at the end of 2002 and represented about 6 per cent of the stock market capitalization of the Toronto Stock Exchange. This total represents a dramatic rate of growth when compared with the \$29.5 billion of total market capitalization at year-end 2001 and \$2 billion at

year-end 1994. The exceptional growth of this asset class has been driven by appreciation in the value of outstanding income trusts, the issuance of units through initial public offerings, and the subsequent sale of additional units by existing income trusts.

An income trust is designed to maximize the cash distributions from a set of revenue-generating assets, with these distributions typically paid to unitholders on a monthly basis. The cash distributions from an income trust are maximized by minimizing or eliminating the corporate tax paid by the operating company that holds these assets. In other words, an income trust is a “flow-through” vehicle that allows income to flow through it and be taxed at the investor level.

The valuation of an income trust is similar to the valuation of any other equity security. Investors discount the future stream of cash flows that are expected to accrue to unitholders using a discount rate that reflects the uncertainty of the business and the capital structure. Three steps are fundamental to the valuation of an income trust: an analysis of the distributable cash, an understanding of the capital structure, and a comparison of one income trust with others in the same industry sector or business. To get an accurate picture of risks and returns, existing income trusts must be valued relative to others in the same industry, using multiples of cash flow that take into account the leverage in the capital structure, the uncertainty of the business, and the tax treatment of different types of distributions.

Firms and investors have benefited from the development of income trusts. Firms have been able to realize significant gains on the sale of assets through this market. They have therefore been able to raise significant amounts of capital by selling off mature assets and either returning the proceeds to shareholders or investing them

\* This note summarizes a recently published Bank of Canada working paper (King 2003).

in potentially more profitable growth opportunities. This avenue of raising capital has particularly benefited small firms or firms that did not have access to Canadian equity markets on attractive terms. For their part, investors have earned high cash returns from income trusts over the past few years—a period when Canadian stock markets suffered significant losses, and interest rates declined to historically low levels. Higher cash payouts reduce the need to monitor management, because investors make the decision on how to reinvest the earnings rather than leaving these funds in the hands of management.

## Issues Raised by Income Trusts

Investors should consider several issues when valuing an income trust. These issues can be classified into four broad categories—legal and regulatory issues, corporate governance issues, operational issues, and market issues.

Legal and regulatory issues include the potential personal liability of unitholders, the possibility of a change in tax treatment, and the treatment of unitholders in the event of bankruptcy. The issue of unitholder liability is being addressed in some provinces. For example, the Ontario government has introduced legislation that would limit the liability of Ontario-based unitholders under the Trust Beneficiaries' Liability Act 2003 (Government of Ontario 2003).<sup>1</sup> Hayward (2002) addresses the tax implications of this asset class.

While they resemble corporate entities, income trusts fall under a different code of law with different requirements for corporate governance. Unitholders in an income trust are represented by a trustee, whose responsibilities are laid out in a trust indenture. The assets owned by the income trust may be managed by full-time internal managers similar to a corporation, but this task may also be contracted to a management company under a management agreement. Investors need to scrutinize these documents in order to understand the staffing of these positions, the incentives for the trustee and managers, their compensation arrangements, and the level of disclosure required for factors such as

potential conflicts of interest. Unitholders should also be aware that their legal rights are more limited than those of shareholders in a corporate entity.

Operational issues relate to the subordination of the unitholder's claim on the operating assets to secured bank loans or other debts, the sustainability of expected cash flows from these assets, and the degree of leverage in the operating company's capital structure. Not every business model is viable as an income trust. For example, this structure is suited to businesses that generate a steady stream of cash distributions and require minimal capital expenditure to maintain the productivity of the assets. Given the proliferation of income trusts in various business sectors, investors need to question the key assumptions regarding cash distributions to ensure that these distributions are sustainable in the long run.

Finally, market issues involve the sensitivity of income-trust valuations to changes in the level of interest rates, the level of risk premiums, and secondary market liquidity. While market conditions have been favourable for income trusts over the past two years, the change in the external environment in the fourth quarter of 2002 led to a decline in their valuation. In 2003, the wide variation in the performance of different income trusts reflects a greater differentiation by investors concerning their future prospects.

These investment issues led Standard & Poor's to introduce a new product in 1999 called stability ratings. These ratings are intended to reflect the "sustainability and variability in distributable cash flow generation in the medium to long term" (Standard & Poor's 2002). A stability rating is voluntary, and income trusts must pay Standard & Poor's to receive one. As of year-end 2002, only 25 Canadian income trusts had been rated.

## Conclusion

A better understanding of the issues raised by income trusts will allow investors to seek the appropriate return for a given level of risk. The mixed performance of this asset class over 2003 suggests that income trusts are evolving and have reached a new phase of consolidation with slower growth expected in the future.

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1. Passage of this legislation was delayed by the Ontario election.

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# Valuation of Canadian- versus U.S.-Listed Equities: Is There a Discount?

*Michael R. King, Bank of Canada and Dan Segal, University of Toronto\**

**T**here is a perception that the equity of Canadian-listed firms trades at a discount relative to the equity of comparable firms listed on exchanges in the United States. If there are systematic differences in valuation between Canadian and U.S. equity markets, Foerster and Karolyi (1999) argue that firms will have an incentive to adopt financing strategies to reduce any negative effects. Such decisions by individual firms could affect the overall depth and liquidity of a country's financial markets, as well as the future viability of those markets.

Our study tests this hypothesis by examining the valuation ratios assigned to the equity of firms listed in these two markets. We find that Canadian-listed firms traded at a discount to U.S.-listed firms over the 1991–2000 period, based on a range of valuation measures. This discount exists even though the median Canadian-listed firm has, on average, a lower cost of equity and higher profitability over the past decade than its U.S.-listed peers. Based on a comparison of Canadian interlisted firms that report under both Canadian and U.S. GAAP, our study rejects accounting differences between Canada and the United States as the source of this discount.

The study focuses on book-to-market and earnings-to-price ratios, and finds that, in line with financial theory, part of the discount is explained by company-specific factors, such as size, industry membership, cost of equity, and profitability. Valuation is also affected by the characteristics of the market where the share is listed. A country discount persists after controlling for company-specific and market-specific factors. This finding is consistent with previous research, which suggests that Canadian and U.S.

financial markets remain segmented (Doukas and Switzer 2000; Jorion and Schwartz 1986).

## Methodology

The analysis uses annual company accounts data and monthly pricing data on Canadian- and U.S.-listed firms for the period 1990 to 2000. Data were provided by Standard & Poor's Compustat and the Canadian Financial Markets Research Centre. The sample consists of close to 10,000 firms, of which about 7 per cent are Canadian-listed firms and the remainder are U.S.-listed firms. Cross-listed Canadian firms were dropped from the sample in order to focus on country-specific effects.

## Factors Affecting Valuation

Differences in valuation for the equity of any given company relative to that of its peers may be explained by company-specific, market-specific, and country-specific factors. Company-specific factors include company size, industry, cost of equity, profitability, the dividend policy of a firm, and secondary-market liquidity. Market-specific variables capture differences in the features of the equity markets that affect all firms listed and traded on a given stock exchange, such as the relative performance of the overall stock market. Finally, country-specific factors capture those institutional features of the financial markets that affect all firms listed and traded within a given jurisdiction, such as the accounting systems used to prepare financial statements.

## Evidence of a Country Discount

To test for the existence of significant differences in the valuation of Canadian- and U.S.-listed equities, we compare the valuation of firms

\* This note summarizes a recently published Bank of Canada working paper (King and Segal 2003).

listed either exclusively in Canada or in the United States and exclude interlisted firms. Each Canadian firm is matched with comparable U.S.-listed firms based on industry sector and the Canadian firm's size. The valuation of the Canadian-listed firm is then compared with the median of its U.S.-listed counterparts based on four valuation ratios. The valuation ratios are: book-to-market, earnings-to-price, free cash flow-to-enterprise value, and earnings before interest, taxes, depreciation, and amortization (EBITDA)-to-enterprise value.

On average, the median Canadian-listed firm traded at a discount to comparable U.S.-listed firms across a range of valuation measures, despite the fact that the average Canadian-listed firm was more profitable. The differences between Canadian-listed firms and their U.S. counterparts are both statistically significant and economically important. For example, the average Canadian firm traded at a multiple of book value that was 8 per cent lower than its U.S.-listed peers, despite having a return on equity that was higher by 1.5 per cent. Canadian-listed firms had a cost of equity that was higher from 1991 to 1995 by as much as 2 per cent, but they enjoyed a lower cost of equity from 1996 onwards.

## **The Effect of Accounting**

Differences in cross-border valuation may result from differences between Canadian and U.S. generally accepted accounting principles (GAAP). This hypothesis is tested by considering the valuation of roughly 160 Canadian firms that interlist on a U.S. exchange. These firms provide financial results under Canadian GAAP, as well as a reconciliation of financial accounts under U.S. GAAP. The valuation and profitability ratios are calculated for each cross-listed Canadian company using both sets of results. The comparison shows that Canadian and U.S. GAAP are close substitutes, consistent with previous research (Bandyopadhyay, Hilton, and Richardson 2002). There is no statistical difference in return on equity, return on assets, or earnings-to-price between Canadian listings and U.S. listings. The differences in the other valuation measures based on Canadian versus U.S. GAAP were either not economically important or showed no consistent pattern. This comparison suggests that accounting differences do

not explain the discount of Canadian-listed firms against their U.S.-listed peers.

## **The Effect of Market-Specific Factors**

Differences in the valuation of Canadian- and U.S.-listed firms may be due to the impact of market-specific factors, such as the characteristics or performance of the stock exchange where a share is listed. This hypothesis is examined using a series of multivariate regressions. The dependent variable for these regressions is book-to-market in one specification and earnings-to-price in a second specification. Each regression includes company-specific variables that have been shown to affect valuation; namely, company size, industry sector, profitability, cost of equity, and earnings retention rate. The inclusion of these variables controls for their impact so that the contribution of market-specific factors can be measured.

Two market-specific variables are included in each regression. The impact of a company's shares having greater liquidity is controlled by including a measure of share turnover. Differences in the risk-adjusted equity returns between Canada and the United States are controlled by including a variable that captures any premium valuation of U.S.-listed firms that may be due to "irrational exuberance." This variable measures the risk-adjusted excess return of each stock market, using a Sharpe ratio. The objective of this specification is to see if a country dummy included in the regression has any incremental power for explaining a firm's valuation. The company-specific and market-specific variables are significant with the correct sign. More importantly, the country dummy is also significant, despite the presence of these other variables, and confirms that Canadian-listed firms trade at a discount to their U.S.-listed peers.

## **Conclusion**

This study finds that Canadian-listed firms are not valued as highly as their U.S.-listed peers, based on comparisons across a series of valuation measures. Variables such as cost of equity, secondary market liquidity, and the risk-adjusted return of the overall stock market did explain part of the discount, but when these factors

were controlled for, Canadian-listed firms still exhibited a systematic discount.

These results confirm earlier studies suggesting that Canadian and U.S. equity markets are not perfectly integrated as theory would suggest. Investors do not view Canadian- and U.S.-listed equities as perfect substitutes but assign a risk premium to Canadian listings. The existence of systematic differences in valuation creates incentives for Canadian firms to access U.S. equity markets. Given the findings of this paper, more research is needed to identify the sources of this market segmentation.

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## Excess Collateral in the LVTS: How Much Is Too Much?

*Kim McPhail and Anastasia Vakos\**

Canada's Large Value Transfer System (LVTS) is the payment system used to make large-value or time-sensitive payments, on a final and irrevocable basis. Thirteen financial institutions (and the Bank of Canada) are direct LVTS participants. The LVTS requires these participants to pledge to the Bank of Canada enough collateral to cover the default of the participant with the single largest net debit position. In the extremely remote event of multiple defaults and insufficient collateral, the Bank of Canada guarantees that the LVTS will settle. Sufficient collateral thus facilitates the safe and continuous flow of payments throughout the day and ensures that the LVTS can complete settlement at the end of the day.<sup>1</sup>

Payments sent through the LVTS and received by each participant can vary significantly from day to day, hour to hour, and even minute to minute. Although participants know in advance many of the payments they will receive and send, they cannot always synchronize these flows. They may have to make large payments before receiving incoming funds. From time to time, they can be faced with making unexpectedly large payments. By holding a buffer of collateral for LVTS purposes, participants can accommodate all of these factors without impeding the timely delivery of payments. A participant with sufficient collateral can also meet its clients' payment needs on a more timely basis, compared with a participant with significantly less collateral. The first participant can therefore provide a higher level of service to its clients.

If an LVTS participant does not minimize the costs associated with holding and managing collateral for LVTS purposes, excessive costs could be passed on to its clients, who could end up paying more for sending LVTS payments than would be optimal. In such a case, clients of this financial institution may be deterred from sending payments via the LVTS. They may instead choose payment systems that are not as well protected against risk. Alternatively, they may choose another financial service provider.

If participants do not hold sufficient collateral for LVTS purposes, one would expect to see an excessive number of occasions when large-value, time-sensitive, or systemically important payments are delayed because of insufficient collateral. This would disrupt payment systems and could inconvenience the clients of LVTS participants.

It is therefore interesting to consider the amount of collateral pledged to the LVTS. To examine this issue, we build a theoretical model that generates the demand for collateral by LVTS participants under the assumption that they minimize the cost of holding and managing collateral for LVTS purposes. Our fairly simple model predicts that the optimal amount of collateral held by each LVTS participant for this purpose depends on the opportunity cost of collateral, the cost of transferring collateral in and out of the LVTS, and the distribution of an LVTS participant's payment flows in the system. We compare the predictions of our model with actual levels of collateral held in the LVTS.<sup>2</sup> We also estimate regressions using panel data to determine how collateral varies in response to changes in factors affecting the demand for collateral.

1. For further information on the LVTS, see Box 6 on page 29 of this *Review*. See also the Bank's Web site at <http://www.bankofcanada.ca/en/payments/systems.html#value>.

\* This note draws on a recent Bank of Canada working paper (McPhail and Vakos 2003).

2. Data on the payment flows and collateral for individual participants are confidential.

## A Brief Description of the LVTS

In the first five months of 2003, an average of about 16,000 payments totalling about \$125 billion flowed through the LVTS each day. The LVTS has two payment streams: Tranche 1 (T1) and Tranche 2 (T2). T2 payments account for 98 per cent of payment volumes and about \$110 billion per day. T1 payments account for 2 per cent of volumes and about \$15 billion in value.

T2 is supported largely by intraday credit. It uses collateral so efficiently that about \$110 billion in payments can be supported by only a few billion dollars of collateral. Participants' collateral requirements for T2 payments change little from one day to another. Hence, there is little need for participants to hold a large buffer of collateral for LVTS purposes to accommodate changes in T2 collateral requirements. We therefore focus on T1 payment flows.

T1 payments must be financed, dollar for dollar, by T1 funds already received or by collateral. It is therefore much more expensive in terms of collateral for participants to send T1 payments than T2 payments. T1 payments tend to be reserved for situations in which insufficient credit is available for a payment to pass through T2 risk controls.<sup>3</sup>

T1 payments averaged \$15 billion per day in the first five months of 2003. Of these, about \$7 billion were sent by financial institutions, and the remainder were sent by the Bank of Canada. T1 payments sent by the Bank are not collateralized, and so are not considered here.

We use data from February 1999 (when the LVTS began operations) up to May 2003. Over this period, daily T1 payments sent by financial institutions averaged \$5.7 billion.

## A Model of the Demand for Collateral in the LVTS

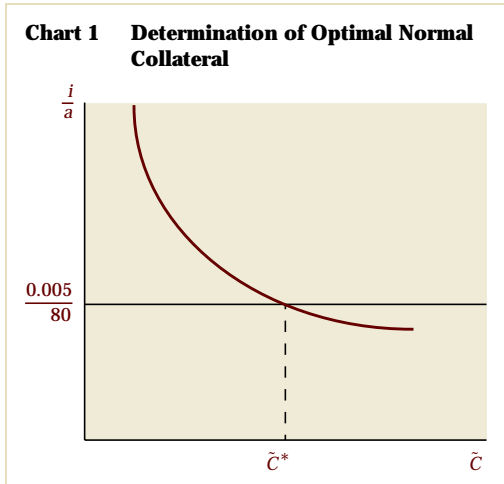
The daily management of collateral by LVTS participants involves making sure that the collateral required to support T1 payments will be available promptly. For LVTS participants, having sufficient collateral for LVTS purposes is analogous to managing an inventory to meet demand. For collateral to be managed efficiently it must be managed at minimum cost. The model used is a simple precautionary demand for collateral.

We assume that participants know the probability distribution of their T1 payments, but do not know their value until the beginning of each day. The distribution of payments is highly skewed—on many days payments are relatively small, and on a few days payments are extremely large.

Participants base the collateral that they pledge to the LVTS on three factors. Each participant chooses an optimal “normal” level of collateral to hold in the LVTS. One dollar of normal collateral has an opportunity cost (defined as  $i$ ) of 5 basis points. Once payments are known, if normal collateral is insufficient to meet the day's payments, the participant will bring additional collateral into the system. Collateral is then returned to its normal level at the end of the day. The fixed cost of increasing collateral (and of subsequently returning it to its normal level) (defined as  $a$ ) is \$80. The interest foregone when collateral must be added to the LVTS (defined as  $j$ ) is 43 basis points times the value of the additional collateral. We assume that participants face a higher cost of collateral if that collateral is obtained at short notice. The benchmark values 5 basis points, 43 basis points, and \$80 are based on anecdotal evidence but, in practice, may differ considerably among LVTS participants.

To minimize the expected total cost of collateral, participants balance the additional cost of holding a higher normal level of collateral for LVTS purposes against the reduction in transactions cost and the reduced need to acquire extra collateral at premium prices (when payments are large). This determines the optimal level of normal collateral.

3. For example, most payments made to the Bank of Canada to support participants' operations in Canada's securities settlement system, CDSX, or in the foreign exchange settlement system, the CLS Bank, rely on T1. For more on these systems, see Box 6 on page 29 of this *Review*.



The equilibrium relationship is shown in Chart 1.

The horizontal line is the cost of normal collateral,  $i$ , divided by the transactions cost,  $a$ . The curve is a function of the shape of the payments distribution, the transactions cost, and the spread between the cost of normal collateral and the higher cost of obtaining collateral at short notice.

The point at which these lines intersect defines the optimal level of normal collateral,  $\tilde{C}^*$ . This point is calculated for each LVTS participant, and these values are used to compute the average optimal level of collateral, which is then compared with the actual average level of collateral. Aggregate results for the system can be found by summing across all 13 LVTS participants. Using our benchmark values for the opportunity costs and transactions costs, we found that the actual level of collateral was considerably higher than that predicted by our model. One participant, however, appeared to have a lower cost of collateral, and when this participant was excluded from the analysis, predicted collateral was within 5 per cent of actual.

To gauge the sensitivity of our results to the benchmark values chosen for transactions and opportunity costs, we experimented with different values for these parameters. We found that halving the transactions cost, from \$80 to \$40, had little effect on the optimal normal level of collateral. A 5-basis-point increase in both the opportunity cost of normal collateral and the price paid for collateral obtained at short notice caused the optimal normal level of collateral to fall by about 20 per cent.<sup>4</sup>

## Empirical Analysis Using Panel Data Regressions

We estimate a regression using panel data to explain the amount of collateral pledged to the LVTS. The variables used to explain collateral demand are T1 payments, the variance of T1 payments, the skewness of T1 payments, and the opportunity cost of collateral.<sup>5</sup> Since we have no data indicating how the cost of

4. Note that the relationship is not symmetric—i.e., an equal reduction in the opportunity cost would not lead to a 20 per cent increase in collateral.
5. Collateral, payments, and the variance of T1 payments are expressed as natural logarithms.

obtaining collateral at short notice and transactions costs vary over time, these variables are not included in our regressions. We use a moving 30-day backward window of the variance and skewness of T1 payments. Our opportunity cost is based on the spread between bankers' acceptances and treasury bills. After November 2001, when the list of securities eligible for use as collateral in the LVTS was expanded, we assume the opportunity cost of collateral to be 5 basis points. The fixed effects that capture institution-specific unobservable variables are incorporated by including dummy variables in the equations for each LVTS participant.

The regression results are in line with expectations. Collateral levels vary positively with the level and variance of T1 payments (the skewness measure is not significant). The coefficients, while statistically significant, are nevertheless very small. This is in line with our theoretical model, which predicts that normal levels of collateral held for LVTS purposes should be sufficient to cover all but the largest 10 per cent of daily T1 payments. Collateral varies negatively and statistically significantly with the opportunity cost of collateral, as we would expect. This effect is also quite significant economically, which is consistent with our theoretical model.

## Conclusion

Our simple model of collateral demand, based on benchmark values for opportunity costs and transactions costs, explains the aggregate amount of collateral pledged to the LVTS quite well, despite the fact that these costs may vary among participants. We find that when we exclude one LVTS participant that appears to have a lower opportunity cost of collateral, aggregate actual collateral is within 5 per cent of the predicted level. Our panel data regressions broadly support our theoretical model. Thus, in aggregate there does not appear to be an excessive amount of collateral pledged in the LVTS.

Our model suggests that it is unlikely that the clients of LVTS participants would be deterred from using the system because participants passed on to them the costs associated with excessive levels of collateral. Our model indicates that for about 90 per cent of the time the "normal" collateral level in the LVTS is enough to cover daily T1 payments. Occasions may

therefore arise when time-sensitive or systemically important payments are delayed as participants try, at short notice, to obtain collateral to meet unexpectedly large payments. These occasions should be rare.

This study suggests several areas for future work. First, in relation to the application of our theoretical model, the use of Extreme Value Theory (EVT) might strengthen our results. Although we have more than 1,100 observations for each financial institution in our sample, relatively few of these lie in the tail of the payments distribution when payments are very large. Second, more information and a greater understanding of the opportunity costs of collateral that is obtained at very short notice would be helpful, because this extra cost is important to explaining the predictions of the model. Finally, our model assumes that collateral can always be obtained at short notice (i.e., stockouts do not occur), so that there is no cost to LVTS participants from delays in making payments. In practice, participants may face financial penalties or reputational damage if it takes time to obtain collateral needed to back time-sensitive payments. This would suggest that participants would choose to hold more collateral than indicated by the model. Including these factors would make for a richer model.

## References

- McPhail, K. and A. Vakos. 2003. "Excess Collateral in the LVTS: How Much Is Too Much?" Bank of Canada Working Paper No. 2003-36.