

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

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

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

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

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

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

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

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

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

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

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

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

Definition and Measurement of Liquidity

A market is generally considered to be liquid if it is possible to trade large amounts of securities in a minimum number of transactions with little impact on prices. Gravelle (1999a) characterizes liquidity according to four dimensions: i) *immediacy*, or the speed with which a transaction can be conducted; ii) *depth*, which refers to the maximum amount that can be traded at a given price; iii) *width*, or the bid-ask spread, which is the cost of accessing liquidity;⁵ and iv) *resiliency*,

which captures how fast prices revert to their equilibrium after a transaction. Given the many dimensions of market liquidity, it is difficult to summarize the concept in a single statistic. There are several ways to measure liquidity, although each has its shortcomings. Frequently used measures include the volume and frequency of trades, the turnover ratio,⁶ the bid-ask spread, the mean transaction size, and the price impact of a trade (Fleming 2003; D'Souza and Gaa 2004).

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

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

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

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

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

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

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

The Evolution of Liquidity in Various Government Bond Markets

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

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

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

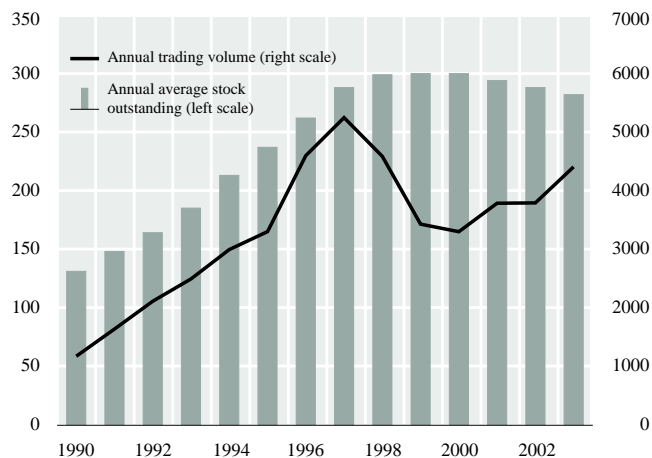
In the U.K. and Japanese markets, turnover ratios trended downward for most of the 1990s, but only the former has seen a significant rebound since 2000. A

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

Chart 1

Government of Canada Bonds, Amounts Outstanding and Transacted

Government of Canada bonds (\$ billions)



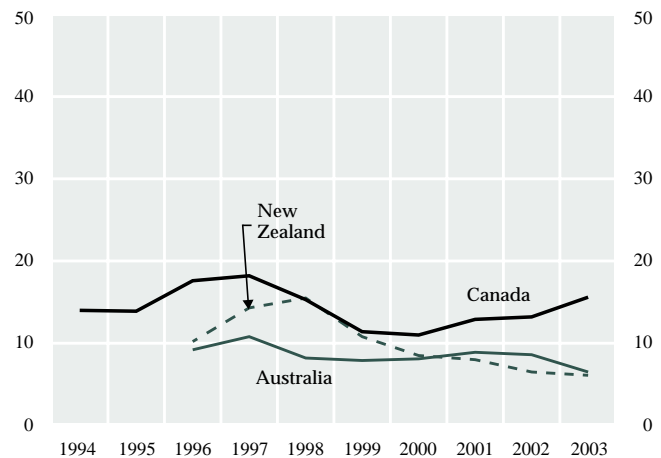
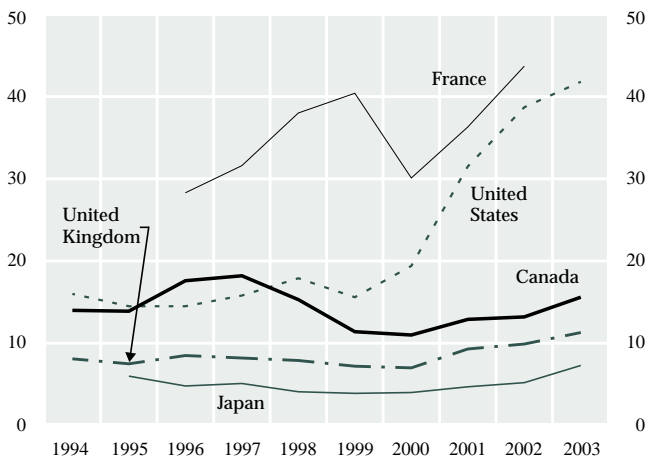
relatively resilient economy, as well as higher interest rates that made investing in the United Kingdom attractive relative to investing in other markets, are factors that may have supported this renewed activity in the U.K. market. In Japan, the general decline in liquidity coincided with a steady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

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

Chart 2

Turnover Ratios in Various Government Bond Markets

Turnover ratios



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

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

From this international comparison, it is evident that turnover ratios can vary considerably from year to year and from country to country. It is possible, however, to

identify common structural and cyclical factors affecting liquidity in most, if not all, sovereign bond markets. The remainder of this article examines several of these factors, as well as some factors that are specific to Canada, in an attempt to explain the evolution of the GoC turnover ratio over the past decade and the main drivers behind it.

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Trends Influencing Liquidity in the GoC Bond Market

Sovereign bond debt: Stock and volume issued

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

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

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

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

Table 1

Gross Annual Issuance in Various Government Bond Markets

In billions of local currency, trillions for Japan

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

* Data for France are expressed in billions of euros for the years 1999–2001. Data for prior years are expressed in "synthetic" euros based on the conversion rate between the euro and the French franc. The term synthetic euros refers to the equivalent amount in euros had the common currency been used before 1999 instead of the national currencies. Source: *OECD Central Government Debt: Statistical Yearbook* (2003)

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

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

After more than a quarter century of budgetary deficits in Canada, the Government of Canada has recorded surpluses each fiscal year since 1997–98 and has paid down \$37.1 billion of market debt over the past six fiscal years (Canada 2003).¹⁰ As well, the annual level of net bond issuance fell from a peak of \$54.0 billion in fiscal year 1996–97 to \$30.2 billion in fiscal year 2002–2003.¹¹ These developments coincided with a decline in transactions in the secondary market for GOC bonds and hence with a fall in the turnover ratio, although the impact has been moderated by initiatives undertaken by the government and by the Bank of Canada to support liquidity, as will be discussed further in the last section of this article.

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

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

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

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

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

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

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

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

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Consolidation in the financial sector

The evolving structure of the Canadian financial services sector, including a wave of consolidations during the past decade, and particularly in the 1997 to 2000

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

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

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

Table 2
Mergers and Acquisitions in the Canadian Financial Services Industry

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

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

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

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

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

This being said, the full impact of the global trend towards increased consolidation may only become evident over time. The consolidation that has taken place in the brokerage and institutional investment industries worldwide may have led certain investors to favour larger, relatively more liquid markets. As the global financial industry consolidates, larger market

participants conducting trades of greater value are emerging. For these participants, depth and liquidity are important market characteristics. This has the potential for a somewhat negative impact on the liquidity of smaller sovereign bond markets such as those of New Zealand, Australia, and, to a lesser extent, Canada.

Recourse to passive investing

Passive investment in fixed-income securities has grown over the years as individuals and institutional investors have begun to realize that the potential benefits of active management are sometimes more than offset by the extra costs associated with it.¹⁶ For example, a study by Greenwich Associates estimates that the total amount invested in domestic bonds by large investment funds in Canada was \$223.0 billion in 2002.¹⁷ Of this amount, the study estimates that \$68.0 billion (or 30.5 per cent) was managed passively, compared with \$22.3 billion in 1998, or approximately 10.8 per cent of the \$206.2 billion invested in domestic bonds during that year. When all asset classes are considered, the amount passively invested in domestic bonds, as a proportion of the total amount of assets under management, increased from 3.9 per cent in 1998 to 10.4 per cent in 2002, according to the same study. This structural shift towards passive investing reduces the number of active participants in the Canadian bond market and the effective amount of bonds available for trading, thereby contributing to a lower volume of activity and turnover ratio than would otherwise be the case.

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

Table 3

Aggregate Dealer Market Shares in the Secondary Market for GoC Bonds

Per cent

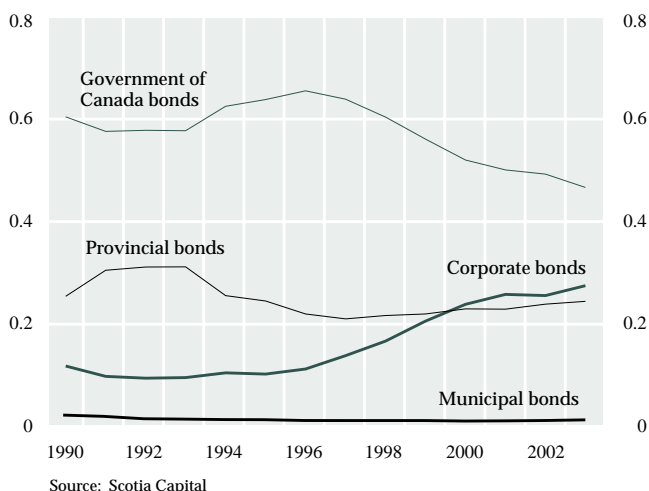
	Government Securities Distributors	
	Top 5	Top 10
1990	54.0	82.4
1991	56.7	83.6
1992	60.8	89.0
1993	57.1	90.0
1994	53.7	88.6
1995	53.4	84.0
1996	52.6	79.8
1997	51.7	84.2
1998	57.9	85.7
1999	60.5	90.2
2000	62.9	92.0
2001	66.9	94.6
2002	70.1	96.2
2003	67.8	95.3

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

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

Chart 3

Year-End Composition of the Scotia Capital Universe Bond Index



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

Financial innovations

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

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

The second factor relates to the size and degree of development of the Canadian bond futures market.

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

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

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

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

Table 4
Measures of Liquidity in Government Bond
Futures Markets

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

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

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

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

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

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

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

Cyclical Factors Influencing Liquidity in the GoC Bond Market

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

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

Changes in investor risk appetite

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

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

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

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

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

Interest rate environment

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

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

Equity-market environment

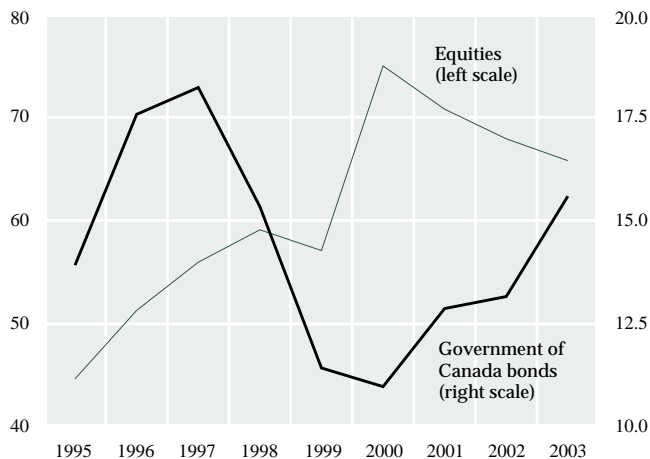
While researchers have begun to explore the links between liquidity in bond and stock markets, much work remains to be done in this area.²² To the extent

that stocks and bonds are substitute assets, it is reasonable to expect that volumes traded, and thus turnover ratios, in the respective markets might be negatively correlated. In particular, cyclical factors might lead trading activity to focus more on one asset class than another at different times.

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

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

Chart 4
Turnover Ratios for the Toronto Stock Exchange and the GoC Bond Market



Source: Bank of Canada and World Federation of Exchanges

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

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

2000 are the revenue breakdown for firms in the Canadian securities industry and the composition of net new mutual fund sales at that time. For the securities industry as a whole, revenue from fixed-income trading activities generated only 5 per cent of total revenue in 2000, at the peak of the equity bubble, compared with 23 per cent in 1991 (IDA 2001). In addition, the Canadian mutual fund industry experienced net redemptions of bond and income funds for the 17 consecutive months between August 1999 and December 2000.²⁴

Policy Initiatives to Foster Liquidity

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

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

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

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

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

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

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

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

Conclusion

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

Turnover ratios have been used in this article, owing to the cross-country nature of the analysis, which limits the ability to use other, more sophisticated measures. Although turnover ratios vary substantially from country to country as well as over time, our analysis suggests that liquidity in the market for GoC bonds is healthy and that its evolution has generally

been in line with that of other markets. After increasing steadily over most of the 1990s, the turnover ratio in the GoC bond market declined between 1997 and 2000, but has since rebounded.

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

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

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