

Liquidity in the Market for Government of Canada Bonds: An Empirical Analysis

*Chris D'Souza**

A liquid financial market is one in which participants can rapidly execute large transactions with only a small impact on prices. Market liquidity contributes importantly to the efficiency of fixed-income markets. In particular, it has an impact on security prices because investors will pay a premium to hold more-liquid bonds. Around the world, government debt managers are keen to foster liquidity to minimize the cost of public funds. Liquidity is important in government bond markets because these securities are used as benchmarks for the pricing and hedging of other fixed-income securities.

From a financial system perspective, where the promotion of efficient and resilient financial markets is an objective of the Bank of Canada, one concern is the two-way causality between shocks to financial markets and sharp reductions in market liquidity. This article provides a short description of the structure of the Government of Canada fixed-income market and a summary of the results of two recent research papers that may contribute to a more complete understanding of liquidity.

The Structure of the Canadian Bond Market

The market for Government of Canada securities is the largest fixed-income market in Canada, with some \$256 billion in bonds (par value, not including Real Return Bonds) and \$117 billion in treasury bills outstanding as at the end of December 2003.¹ Average daily trading volumes for Government of Canada bonds and

bills in 2003 were \$17.5 billion and \$4.9 billion, respectively.² Like most sovereign securities markets, the market for Government of Canada securities is primarily a wholesale, institutional market, where a number of professional participants (securities dealers, pension funds, investment managers, insurance companies, and mutual funds) conduct very large trades (often in excess of \$25 or \$50 million) on a relatively infrequent basis. The market is generally described as being divided into the primary market, where Government of Canada securities are sold through auctions, and the secondary market, where transactions are either customer-dealer or interdealer in nature.

Institutional investors typically trade with securities dealers on a bilateral, over-the-counter basis. The results of these bilateral customer-dealer trades are known only to the two counterparties rather than to the entire market, thus limiting the impact of large trades on prices.³ Given the unpredictable inventory shocks that dealers face in their large trades with customers, interdealer debt markets have developed to facilitate inventory management and risk-sharing. While historically these interdealer markets were also direct and bilateral in nature, the introduction of interdealer brokers (IDBs) has significantly reduced the role of direct interdealer trading.

The current Canadian IDBs are screen-based voice brokers, which allow dealers to trade anonymously with each other. Each participant has a screen where bids, offers, and trade outcomes are posted. Participants post quotes and make trades by communicating with the broker

1. Gravelle (1999) provides a detailed discussion of the structure of the Government of Canada securities market.

* This article discusses two recently published Bank of Canada working papers (D'Souza, Gaa, and Yang 2003; D'Souza and Gaa 2004).

2. Source: Investment Dealers Association of Canada <www.ida.ca>. The data exclude repos.

3. More recently, electronic platforms have been introduced in Canada. One offers simultaneous multiple-dealer quote inquiries and trading; another offers order-driven trading.

over the telephone. The level of transparency in the IDB market was enhanced with the 20 August 2001 introduction of CanPX.⁴ CanPX is a data service that consolidates and disseminates to interested subscribers anonymous trade and quotation data submitted by Canada's fixed-income interdealer brokers.

While studies of conditions in the intraday U.S. Treasury market have told us a great deal about the U.S. government securities market (e.g., Fleming 2001), the first such examinations for Canada are addressed in D'Souza, Gaa, and Yang (2003) and D'Souza and Gaa (2004). The first paper empirically measures liquidity in the Canadian bond market, using a number of indicators proposed in the literature, and describes price and trade dynamics in the secondary market for Government of Canada bonds. The second paper analyzes how fixed-income markets in Canada provide liquidity when new information arrives in the market. Findings suggest that the Canadian brokered interdealer fixed-income market is relatively liquid, and that its liquidity dynamics are comparable to those of the U.S. Treasury market. The empirical analysis of both papers focuses on the benchmark (or "on-the-run") 2-, 5-, 10-, and 30-year Government of Canada bonds.

Measuring Liquidity

The challenge of measuring liquidity has been exacerbated by a lack of data. D'Souza, Gaa, and Yang (2003) construct and evaluate a range of indicators for activity and liquidity in the market for Canadian government bonds, using a new dataset. Bid-ask spreads, trading volume, trade frequency, quote size, trade size, and price-impact coefficients are analyzed at intraday frequencies in the interdealer-broker market. The price-impact coefficient measures how much prices adjust to reflect the information content of trades.⁵ Their results suggest that bid-

ask spreads and price-impact coefficients are the most appropriate indicators of liquidity, followed in approximate order by trade size, quote size, trading volume, and trade frequency.

The Effect of Public News Events

One important feature of government debt markets is the extent to which they are driven by public news, particularly the scheduled release of macroeconomic data. D'Souza and Gaa (2004) examine the role of public information and the relationship between activity, price volatility, and liquidity by exploring the impacts of i) Canadian and U.S. announcements of macroeconomic news, and ii) Government of Canada bond auctions. The determination of liquidity in the market for Canadian government securities is examined from an event-study perspective.⁶

It is usually argued that, given the nature of fixed-income government securities, there is little scope for insider information to affect markets. Kim and Verrecchia (1994) argue that *informed* traders possess an informational advantage after an event because of their ability to better interpret the announced information. Liquidity will remain low as long as the informed traders maintain their interpretation advantage. Traditional models of market microstructure predict that liquidity will deteriorate around the release of an anticipated announcement and will return to normal afterwards (Admati and Pfleiderer 1988; and O'Hara 1995). After the news announcement, there may be a period of abnormally high trading activity as information is processed and traders rebalance their portfolios. Volatility may also increase temporarily as investors adjust their beliefs. After an adjustment period, liquidity will revert to normal, and volatility will subside.

When macroeconomic news is announced, a two-stage adjustment process is observed in the Government of Canada securities market. This finding is consistent with the asymmetric information interpretation of market liquidity and with U.S. evidence (Fleming and Remolona 1999). In the first stage, bid-ask spreads widen in the five-minute intervals before and after an

4. Zorn (p. 39 of this *Review*) elaborates on recent discussions between regulators, academics, and market participants associated with the issue of transparency and regulation in Canadian fixed-income markets.
5. Price-impact coefficients are suggested by Kyle (1985). They measure "the rise (fall) in price that typically occurs with a buyer-initiated (seller-initiated) trade" (Fleming 2001). Price-impact coefficients can be used to characterize liquidity in financial markets since liquid markets are those that accommodate trades with the least impact on prices.

6. See MacKinlay (1997) for a survey on event-study methodology.

announcement. In an extended second stage, price volatility, quotation and trading activity, and price-impact coefficients increase to higher-than-normal levels in the time period following the release of news and the first stage, with statistically and economically significant effects persisting up to 15 minutes after the event, in some cases.

Similarly, in the half-hour following the release of the auction results, volatility, trading volumes, trade and quote frequency, and price-impact coefficients are all larger than normal as investors adjust their beliefs to information from the auction results.⁷

Overall, the results of D'Souza, Gaa, and Yang (2003) and D'Souza and Gaa (2004) are consistent with survey results for G-10 countries presented by Inoue (1999),⁸ and suggest that the Canadian fixed-income market is relatively liquid, and that it reacts to news in a manner consistent with theoretical predictions and with U.S. evidence.

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7. In Government of Canada bond auctions, dealers bid for themselves and may also submit bids for their clients. Dealer information about their client demands is private and may reflect information about the fundamental value of the security that is to be auctioned.

8. The BIS Study Group on Market Liquidity (Committee on the Global Financial System) conducted the survey, using a common questionnaire, on the structural features of 11 government securities markets: Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom, and the United States. The survey was based on the understanding that the degree of market liquidity is at least partly affected by market structure.