

Staff report on corporate bond market liquidity

Summary

This report¹ describes and presents a series of measurements intended to broadly characterize certain aspects of the liquidity and functioning of corporate bond markets over the past several years. Most of these measures relate to the so-called secondary market, where bonds trade among retail and institutional investors after their initial offering. Such transactions are typically intermediated by a dealer that performs matching, pricing, and operational functions, sometimes deploying its own capital in the process of providing liquidity. Key concerns of secondary market participants, captured by the concepts of market liquidity and functioning, include the ability to buy or sell securities, even in significant amounts, relatively rapidly without adversely moving market prices. For context, information is also provided regarding primary market activity—that is, the initial sale of bonds to investors, facilitated by an underwriter, which is generally a dealer that may deploy its own capital in the process. Among the findings of this report, regarding the primary and secondary markets respectively, are:

- 1) The pace of primary corporate bond issuance – through which nonfinancial corporations raise new funds – has been robust in the United States in recent years. Favorable market conditions have both encouraged corporations to issue debt in an environment of low market interest rates and made such instruments attractive to investors looking for assets yielding more than Treasury securities, particularly as macroeconomic performance has improved and default rates on corporate debt have remained low. Strong demand for fixed-income securities, and hence the pace of issuance, has also been bolstered by the

¹ This report has been agreed to by the staff of the Office of the Comptroller of the Currency, the Federal Reserve Board, the Federal Deposit Insurance Corporation, the Securities and Exchange Commission, and the Commodity Futures Trading Commission (collectively referred to as the Agencies). The Agencies have expressed no view regarding the analysis, findings, or conclusions contained in this report.

growth of certain types of investment vehicles, including long-term mutual funds and exchange-traded funds, with mandates that entail investments in corporate credit.

- 2) Secondary market liquidity – the ability of and cost to investors to easily buy and sell corporate bonds – is in general limited for seasoned corporate bonds, compared, for example, with corporate equities. Measures that capture different aspects of secondary bond market liquidity have shown mixed trends in recent years. The average round-trip cost of buying and selling corporate bonds in the secondary market spiked in the financial crisis, but has returned to its pre-crisis level, suggesting reasonable levels of liquidity recently. Consistent with stressful market conditions during the financial crisis, there was a noticeable reduction in the fraction of very large trades of speculative grade bonds in 2008 and 2009; and, unlike the case of round-trip cost, the fraction of very large trades has remained relatively low in more-recent years.² The average daily trading volume in corporate bonds has stayed relatively low for speculative-grade bonds since the end of the financial crisis, but has been in a range somewhat higher than the pre-crisis years for investment-grade corporate bonds.

Primary Market Issuance

The upper panel of Exhibit 1 shows quarterly gross issuance of nonfinancial corporate bonds over the past decade. The pace of issuance dropped during the most acute phase of the financial crisis in the second half of 2008, but rebounded sharply early in 2009. Since the middle of 2010, issuance of both investment grade and speculative grade bonds has been robust, and total annual issuance reached a record high in 2013.³ As depicted in the middle panel of Exhibit 1, low market interest rates have likely provided strong incentives for firms to issue

² Speculative-grade bonds are bonds rated BB+ or below.

³ Investment-grade bonds are bonds rated BBB- or above.

bonds to fund new business activities and to refinance their existing debt. For example, as can be seen in the lower panel of Exhibit 1, since 2009, a large portion of issuance by speculative-grade nonfinancial corporations was reportedly used to refinance existing debt. Nonetheless, net new issuance, defined as gross issuance less redemptions of existing debt, has also been substantial in recent years. As a result, the total amount of corporate bonds currently outstanding (not plotted) is substantially larger than it was prior to the financial crisis.

Secondary Market Liquidity

The degree of secondary market liquidity captures the ease or difficulty with which investors in corporate bonds can buy and sell existing corporate bonds in the marketplace. Most bonds trade primarily in decentralized “over-the-counter” (OTC) markets in which trades are often arranged by phone, and dealers play significant roles by intermediating trades between buyers and sellers.⁴ Because no single metric can capture all of the aspects of liquidity in this diverse and fragmented marketplace, below we report statistics that address different aspects of liquidity, including the volume of trading activity as well as the average costs associated with trading. Moreover, it should be noted that, while the measures described below are considered to be informative about corporate bond market liquidity, all of the measures provide imperfect signals of market liquidity, and movements in each of the measures must be interpreted cautiously in the broader context of the set.

Aggregate volume of corporate bond trading

Corporate bonds, typically held in buy-and-hold investment portfolios, do not trade much on average. As is the case for other fixed-income securities, trading is more active for corporate bonds that have been issued recently; trading tends to fall over time as bonds gradually find their way into the portfolios of ultimate buy-and-hold investors. Older, or “seasoned,” bonds tend to

⁴ A small number of corporate bonds are listed on exchanges.

trade less frequently.⁵ As shown in the upper panel of Exhibit 2, in a typical day, less than 25 percent of seasoned bonds have at least one trade, and the other 75 percent of seasoned bonds do not trade at all during the day. In contrast, fewer than 20 percent of the number of exchange-traded securities, including stocks, Exchange-Traded Funds (ETFs), and American Depositary Receipts (ADRs), do not trade on a given day.⁶ This suggests that on average, seasoned corporate bonds are relatively illiquid compared to equity-like securities.

The fraction of seasoned bonds that trade in a typical day can also be considered as a rough measure of concentration in trading activities across bonds. During the most acute phase of the financial crisis, around 15 percent of the seasoned corporate bond universe was traded on a typical day, perhaps a result of investors and dealers gravitating towards more liquid bonds to trade when liquidity was most scarce. The measure gradually increased to around 25 percent in 2010 and remained roughly stable since then, suggesting that more bonds are actively trading than during or before the crisis.

The middle panel of Exhibit 2 shows the *dollar volume* of trading of seasoned corporate bonds (rather than the *number* of bonds traded which is plotted above). Recently, an average of roughly \$18 billion of seasoned bonds have traded each day, representing less than 0.4 percent of the dollar amount of all corporate bonds outstanding. This is significantly lower than the daily turnover in the stock market, where around 1 percent of the stocks outstanding are traded every day.⁷

The lower panel of Exhibit 2 shows the dollar volume of trading per seasoned bond for investment grade and speculative grade bonds separately. Before the financial crisis, speculative grade bonds traded more than investment-grade bonds. This likely reflects the fact that

⁵ We define a bond as seasoned if it was issued more than 60 days ago.

⁶ The number is based on staff calculations.

⁷ The number is based on staff calculations.

speculative-grade bonds tend to attract investors who are less likely to hold those bonds until maturity, and thus have shorter holding periods and investment horizons for these bonds.

In terms of recent trends, the middle panel of Exhibit 2 shows that aggregate trading volume of seasoned corporate bonds has held relatively stable since the financial crisis. The lower panel of Exhibit 2 shows that on a per-bond basis, the trading volume of investment grade bonds (in black solid line) exhibits a similar pattern as the aggregate volume in the middle panel of Exhibit 2. However, since 2011, the trading volume for speculative-grade bonds has been fluctuating at a low level compared to the pre-crisis period.

Trading volume, or turnover, is widely used in the industry as a heuristic gauge of market liquidity; however, exactly what drives trading volume is still an open question in the academic finance literature. Trading volume tends to be counter-cyclical in the stock market, in that trading volume tends to peak in recessions. We find that corporate bond market turnover was also somewhat elevated in the first half of 2009, when market liquidity appears to have been low. Thus, we caution against over-interpreting trends of market liquidity directly from market trading volume.

Execution costs for trades of typical size

The price that dealers charge investors when selling a bond (the “ask” price), is generally higher than the price at which dealers are willing to buy the bond from an investor (the “bid” price). The difference between the two prices, typically called the “bid-ask spread,” captures the cost of conducting a round-trip transaction for the investor or the mark-up that the dealer earns by intermediating two sides of the trade. The spread helps compensate dealers for their order-processing cost, adverse selection⁸ cost, and the cost for bearing the risks of holding bonds in

⁸ Adverse selection risk corresponds to the possibility that dealers trade with customers who possess superior information regarding security value, and thus are more likely to lose money in the trade.

their inventory until they locate willing counterparties. Lower values of the bid-ask spread correspond to more liquidity, because they indicate that it is less costly for buyers and sellers to trade with dealers.

In the corporate bond market, there is limited pre-trade transparency, in that dealers typically do not maintain executable bid and ask quotes for bonds. It is thus impossible to calculate a “quoted bid-ask spread,” as is typically done in the equities market. However, public dissemination of information regarding executed trades through the Financial Industry Regulatory Authority’s Transaction Reporting and Compliance Engine (TRACE) system has been in place since 2003. It is thus possible to calculate “effective bid-ask spread” using prices of executed trades.

We estimate effective bid-ask spread by calculating, for the same bond on the same day, the difference between trade-size weighted-average dealer ask prices and trade-size weighted-average dealer bid prices, and then average the bid-ask spread across all bonds traded each day.⁹ The transaction cost of corporate bonds varies substantially with trade size, with smaller trades being typically more costly to trade.¹⁰ Since more than 85 percent of the trades in seasoned corporate bonds are in amounts smaller than \$1 million (see the upper panel of Exhibit 4), the bid-ask spread measures we calculate mainly capture trends in the transaction cost of an average-sized trade, rather than the costs that might be associated with very large transactions, as shown later.

⁹ By “ask,” we refer to price of executed trade in which a dealer is selling to customer; by “bid,” we refer to price of executed trade where a dealer is buying from customer. Our effective bid-ask spread is similar to the “realized bid-ask spread” in Sugato Chakravarty and Asani Sarkar, “Liquidity in U.S. Fixed Income Markets: A Comparison of the Bid-Ask Spread in Corporate, Government and Municipal Bond Markets,” *Federal Reserve Bank of New York Staff Report*, no. 73 (1999).

¹⁰ See Amy K. Edwards, Lawrence E. Harris, and Michael S. Piwowar, “Corporate Bond Market Transaction Costs and Transparency,” *Journal of Finance* 62, no. 3 (2007): 1421-51.

As shown in the upper panel of Exhibit 3, the bid-ask spread of an average bond typically stays above 0.50 percent,¹¹ which is an order of magnitude larger than the average bid-ask spread typically found in the equities market.¹² With the exception of a brief period during the fall of 2008,¹³ speculative-grade bonds (the red dotted line) on average, have larger bid-ask spreads, than investment-grade bonds (the black solid line), and thus are more costly to trade. This may arise from the fact that prices of speculative-grade bonds are more volatile, and so carrying them in inventory exposes dealers to more price-risk.

The bid-ask spreads for both investment-grade and speculative-grade bonds rose substantially during the financial crisis in 2008, and have trended down since then, reaching quite low levels in recent months.¹⁴ On average, bid-ask spreads of investment-grade bonds are currently back to the low level reached in 2006, and bid-ask spreads of speculative-grade bonds are currently at historically low levels. All told, these effective bid-ask spreads suggest solid secondary market liquidity in recent years.

As shown in the middle panel of Exhibit 3, among investment-grade bonds, the bid-ask spreads for bonds issued by both financial and nonfinancial corporations behaved somewhat differently during the financial crisis, with the bid-ask spreads of financial-sector corporate bonds rising faster in 2007 leading up to the crisis, and reaching a peak after the bankruptcy of Lehman Brothers, when market liquidity was evidently quite poor. Bid-ask spreads of financial corporate bonds generally remained above those of nonfinancial corporate bonds in the years

¹¹ The unit of bid-ask spread is in dollars per \$100 face value.

¹² See, e.g., Terrence Hendershott, Charles M. Jones, and Albert J. Menkveld, "Does Algorithmic Trading Improve Liquidity?," *Journal of Finance* 66, no. 1 (2011): 1-33.

¹³ Bid-ask spread of investment-grade bonds surpassed the bid-ask spread of speculative-grade bonds in the fall of 2008, immediately after Lehman Brothers went into bankruptcy, likely due to the fact that the bid-ask spread of corporate bonds issued by financial companies rose sharply during this period, and most of these financial corporate bonds are investment grade. The difference in bid-ask spread between financial and nonfinancial corporate bonds post Lehman bankruptcy can also be seen in the middle panel of Exhibit 3.

¹⁴ Bid-ask spread increased briefly during the European crisis in the summer of 2010 and 2011, and to a lesser extent during the summer of 2013.

following the financial crisis until the end of 2012. Bid-ask spreads for both financial and nonfinancial corporate bonds are currently at relatively low levels, comparable to their levels in 2006 prior to the onset of the financial crisis and indicating typical liquidity.

It can be informative to split the bid-ask spread into a “bid-side half spread” and an “ask-side half spread.”¹⁵ The ask-side half spread represents the premium dealer’s demand when selling a given bond to the market, whereas the bid-side half spread represents the discount that dealers demand when buying a bond from the market.

As shown in the lower panel of Exhibit 3, prior to the financial crisis, the ask-side half spread was significantly greater than bid-side half spread, which is consistent with the notion, described in Li and Schurhoff (2013), that “bonds are sold, not bought...identifying investors willing to buy is considered dealers’ most crucial and costly task.”¹⁶ These measures suggest that during the financial crisis, dealers may have become more reluctant to take corporate bonds into their inventories, as the bid-side half spread rose much more sharply than the ask-side half spread. Recently, the ask-side half spread has been at a level similar to that seen in 2006, while the bid-side half spread is slightly higher than its level in 2006.

Execution of large trades

The ability to buy or sell large positions is important for some institutional investors in the corporate bond market that have sizable volumes of assets under management, such as pension funds, mutual funds, and insurance companies. It is beneficial to such investors to be able to execute large trades without having their trades substantially move the prices of the securities that they are trading. As can be seen in the upper panel of Exhibit 4, the percentage of

¹⁵ We calculate bid-side half spread as the difference between the average price of interdealer transactions and the average price at which dealers buy from customers. Similarly, ask-side half-spread is the difference between the average price at which dealers sell to customers and the average price of interdealer transactions.

¹⁶ Dan Li and Norman Schurhoff, “Dealer Networks,” (working paper, 2013).

corporate bond trades of volume \$1 million or greater declined noticeably for both investment-grade and speculative-grade bonds around the time of the financial crisis.

The fraction of large trades for investment grade bonds has recovered somewhat since 2009, but remains low for speculative-grade bonds. That said, even for investment grade bonds, the average size of these large trades, as shown in the middle panel of Exhibit 4, has declined since the onset of the financial crisis in 2007.

Dealer inventories of corporate bonds

As noted, dealers in the secondary market serve as intermediaries between buyers and sellers. The willingness and ability of dealers to hold inventories of corporate bonds in the process of intermediating buyers and sellers may be an important factor for determining liquidity in the secondary market.

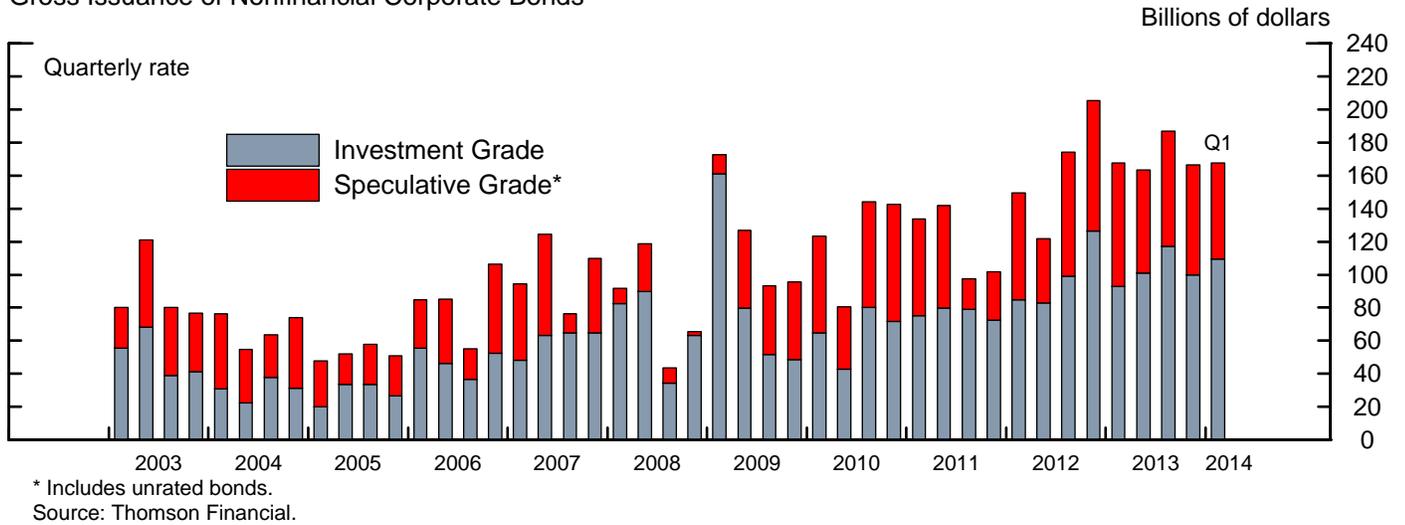
The lower panel of Exhibit 4 shows broker-dealer holdings of corporate and foreign bonds. Broker-dealers may currently be holding corporate bonds in their inventory for various reasons, including both activity for customers as well as other principal activity.¹⁷ Thus, this data cannot be relied on to show dealer inventory held only for the purpose of making a market. Broker-dealers' aggregate holdings of bonds have declined significantly since the financial crisis and have remained at relatively low levels through recent months.

¹⁷ While Section 13 of the Bank Holding Company Act and its implementing rules will restrict a banking entity's proprietary trading activity, a banking entity is not required to fully comply with these restrictions until the end of the conformance period, which is July 21, 2015.

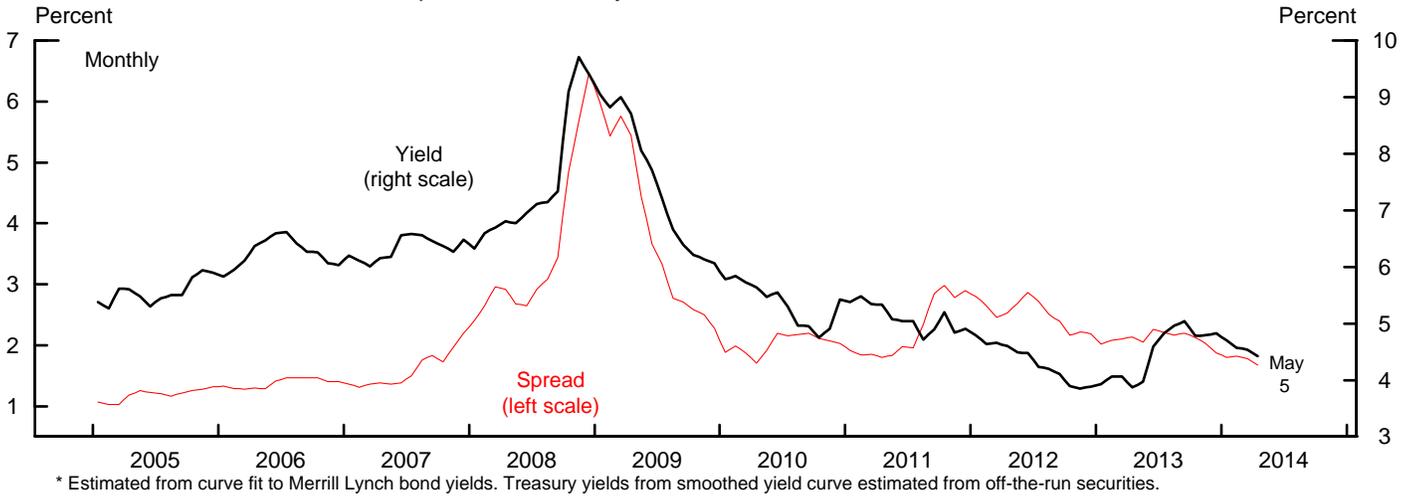
Corporate Bond Liquidity Monitor

Exhibit 1

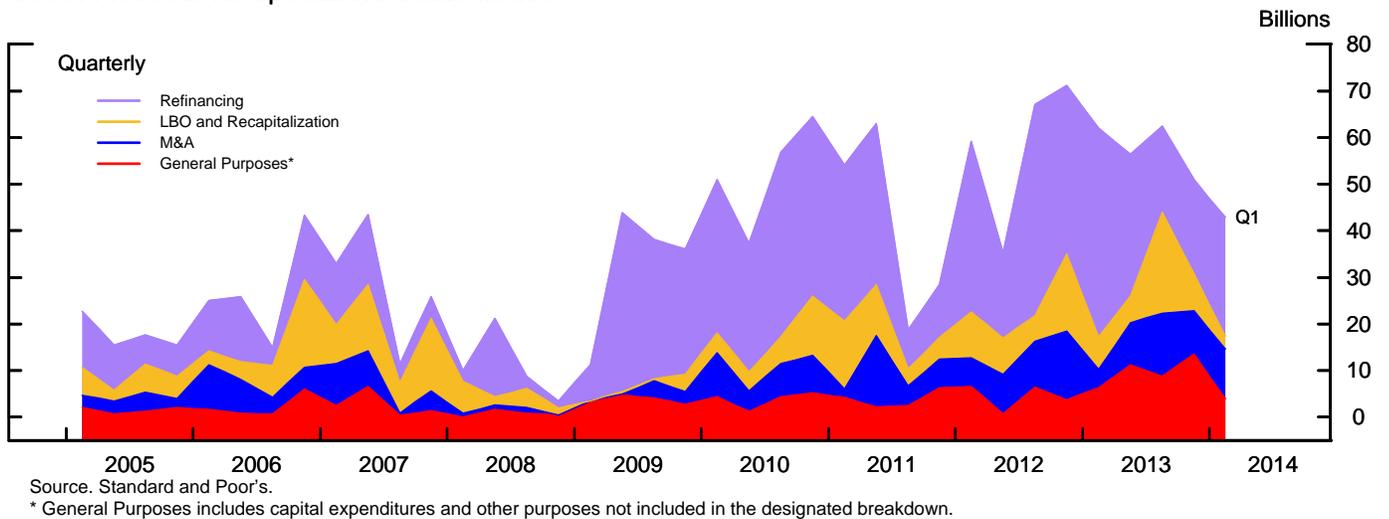
Gross Issuance of Nonfinancial Corporate Bonds



Ten-Year BBB Bond Yield and Spread to Treasury*



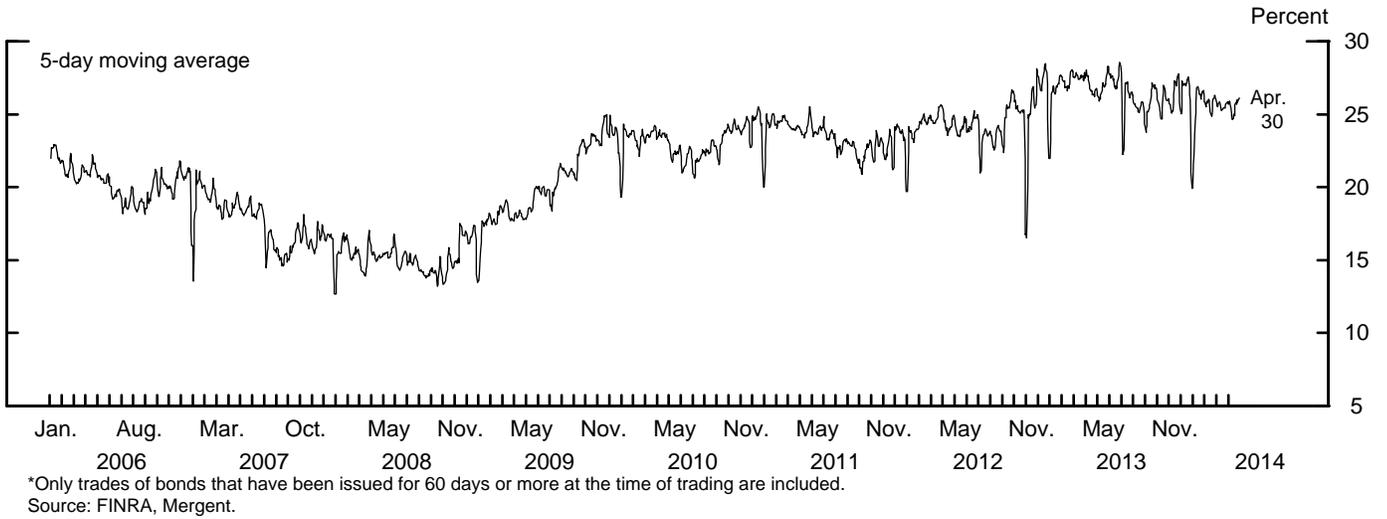
Use of Proceeds for Speculative Grade Issues



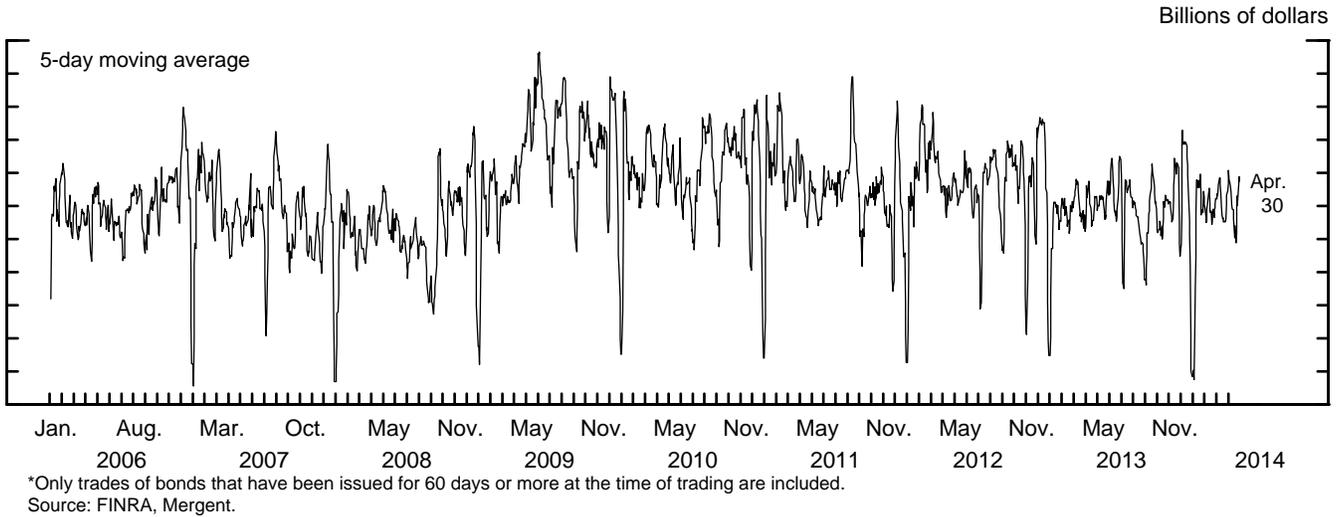
Corporate Bond Liquidity Monitor

Exhibit 2

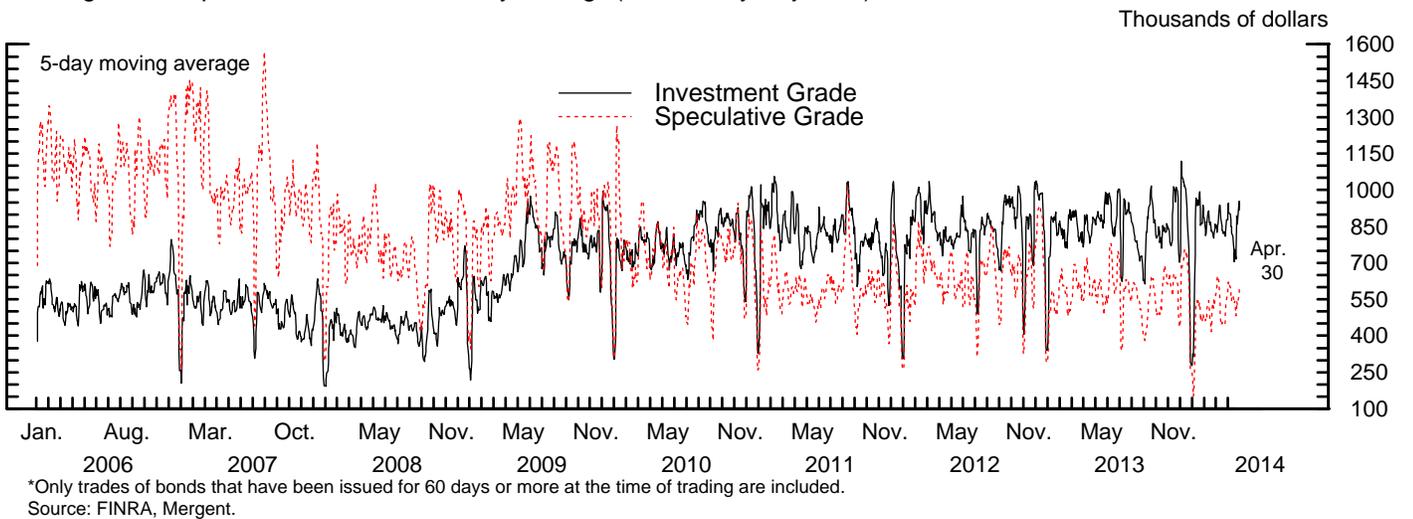
Number of Traded Bonds as a Fraction of Total Disseminated*



Trading Volume for All Disseminated Bonds* (Seasonally Adjusted)



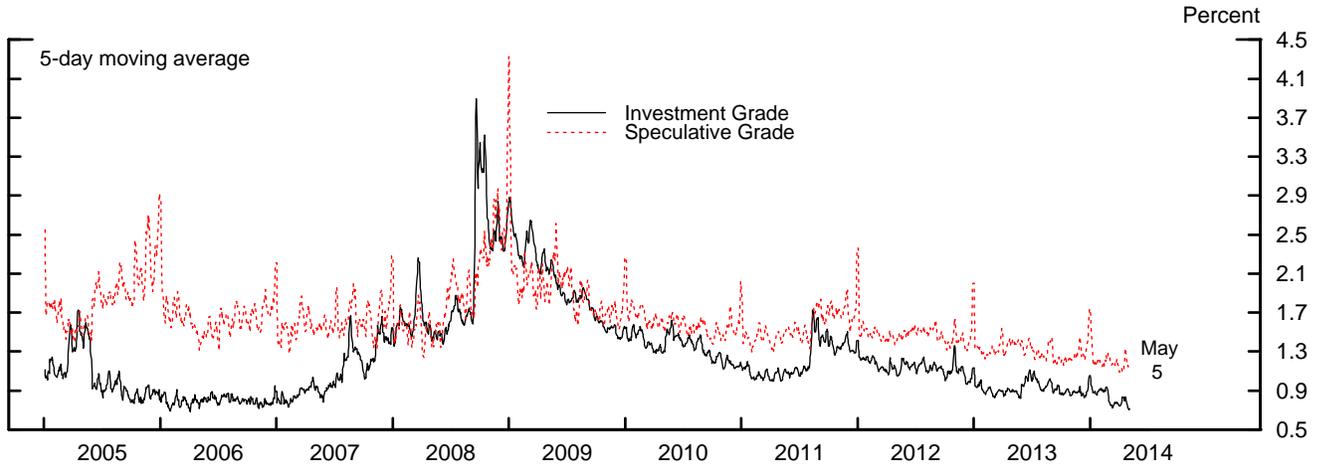
Trading Volume per Disseminated Bond by Rating* (Seasonally Adjusted)



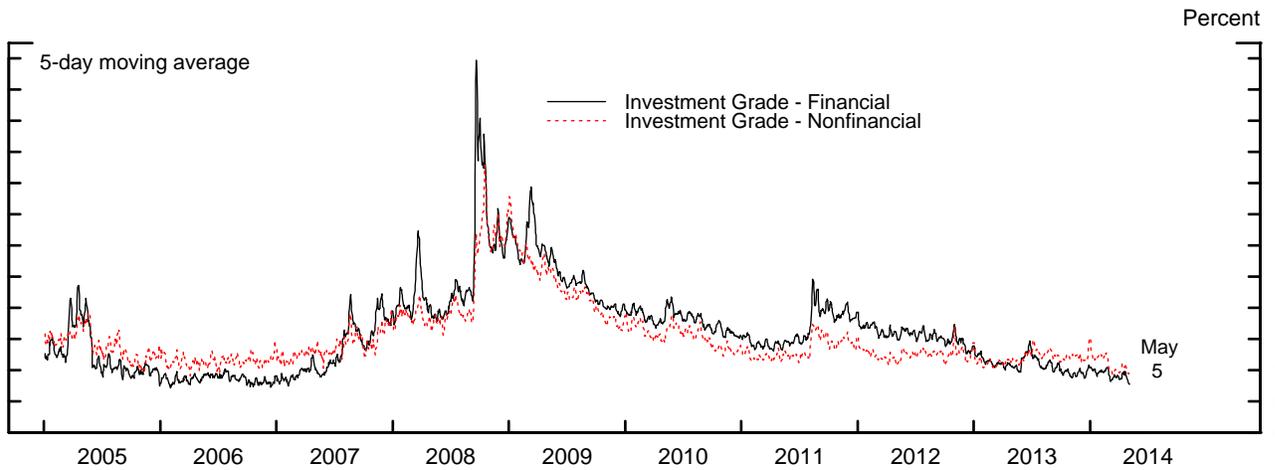
Corporate Bond Liquidity Monitor

Exhibit 3

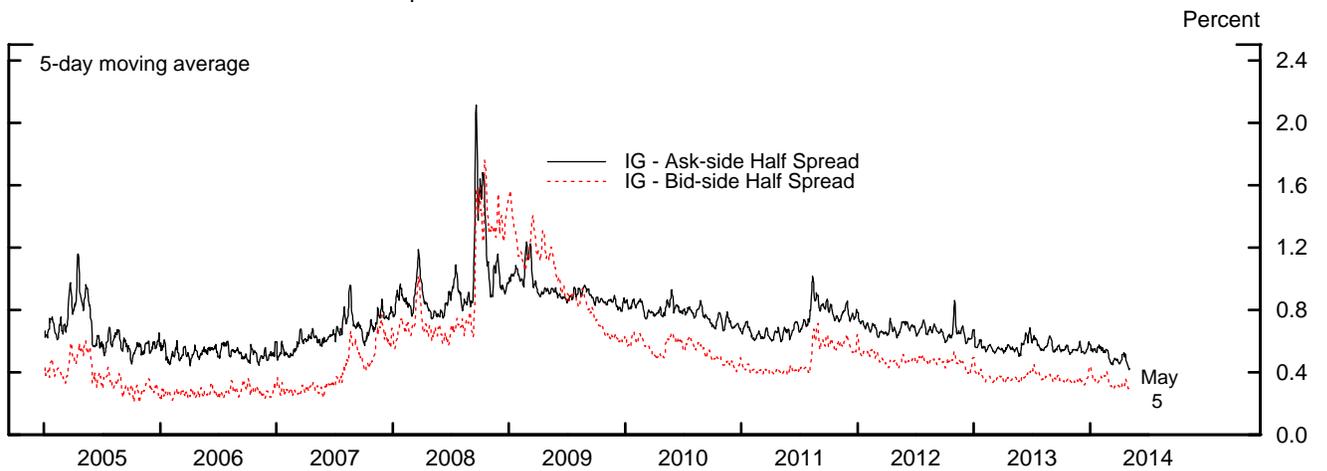
Effective Bid-Ask Spread for All Bonds



Effective Bid-Ask Spread for Investment Grade Bonds: Financial vs Non-Financial



Effective Bid-side and Ask-side Half Spread for Investment Grade Bonds



*All measures are computed for non-defaulted bonds on the secondary market that have traded at least 10 times between 10:30am and 3:30pm.

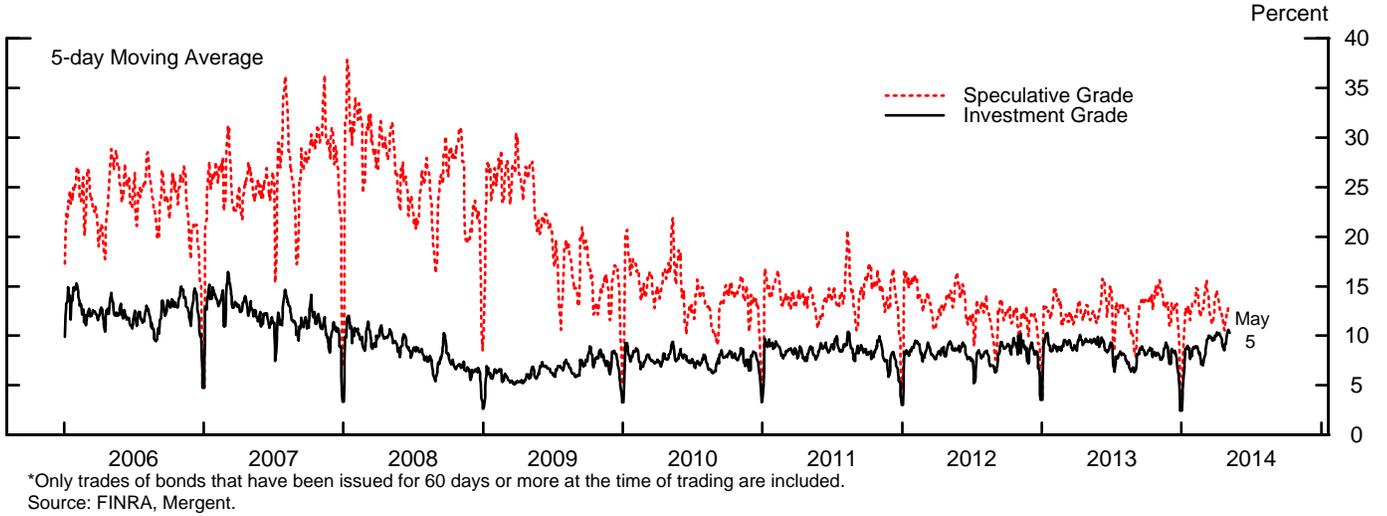
Effective Bid-Ask spread is the difference between weighted average dealer bid prices and ask prices

Source: Finra, SDC, FISD, Moody's DRD.

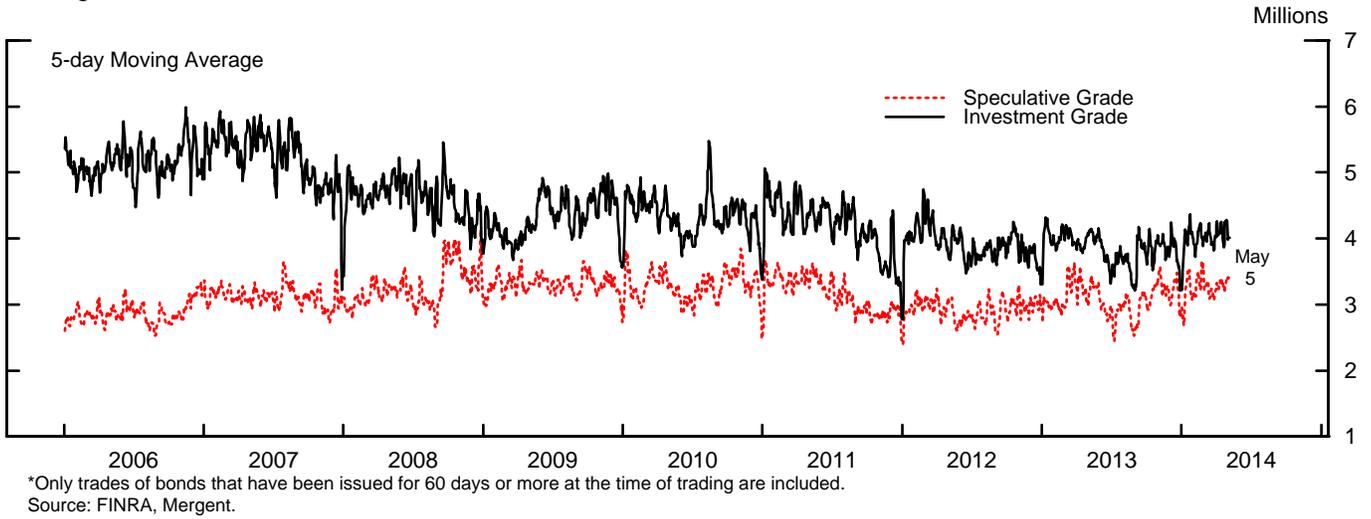
Corporate Bond Liquidity Monitor

Exhibit 4

Percentage of Trades Greater than 1 Million in Par Value*



Average Size of Trades that are Greater than 1 Million in Par Value*



Broker-Dealer Holdings of Corporate and Foreign Bonds*

