

Analysis of Corporate Bond Liquidity

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1. Introduction

This research note explores liquidity provisions in the corporate bond market using a variety of metrics. We analyze all TRACE corporate bond transactions from January 2003 to September 2015, segmenting the market into two groups: the 1,000 most active issues each year with respect to the par volumes of trades and a growing set of less actively traded bonds. Most measures suggest a healthy market: Across both segments, transaction volumes have continued to grow, the number of trades is rising, bid-ask spreads have narrowed and the impact of trades on prices continues to fall.

By several measures though, there is evidence of potentially significant changes in the market structure for corporate debt. Both the buy-side and sell-side appear to require more trades to transact a given volume. Average trade size for the 1,000 most active issues dropped almost 35% between 2007 and 2013, and the proportion of total volume traded in blocks of \$5 million or more has fallen by almost 15%. In the less actively traded bonds, representing 28,000 issues on average, these impacts are smaller: average trade size fell 22% between 2007 and 2013, and the proportion of volume traded in blocks has fallen less than 10%. These latter trends are consistent with a market that has a larger number of issues, more electronic trading, and a growing network of counterparties.

An important caveat in this analysis is that the choice of baseline matters in how to interpret the data. TRACE data only begins in July 2002 and the period through 2007-2008 represent the run up to the financial crisis. It is immediately followed by the post-crisis period, 2009-2011, which is marked by a significant drop in activity followed by a spike in almost all measures. It is not clear that any of the historical data represent a “normal” period to be used as a baseline.

2. The Long Tail

Many analysts have noted the current health of the new issue market in corporate bonds.² The possible end of the zero interest rate Federal Reserve policy has led to another surge in issuance. As noted in a recent *Wall Street Journal* article, 2015 will represent a record year for corporate bonds, with over \$1 trillion issued in the first three quarters.³ This follows more than \$1.4 trillion in new issues in 2014, and four years from 2010-2013 with more than \$1 trillion in corporate bond issuance.

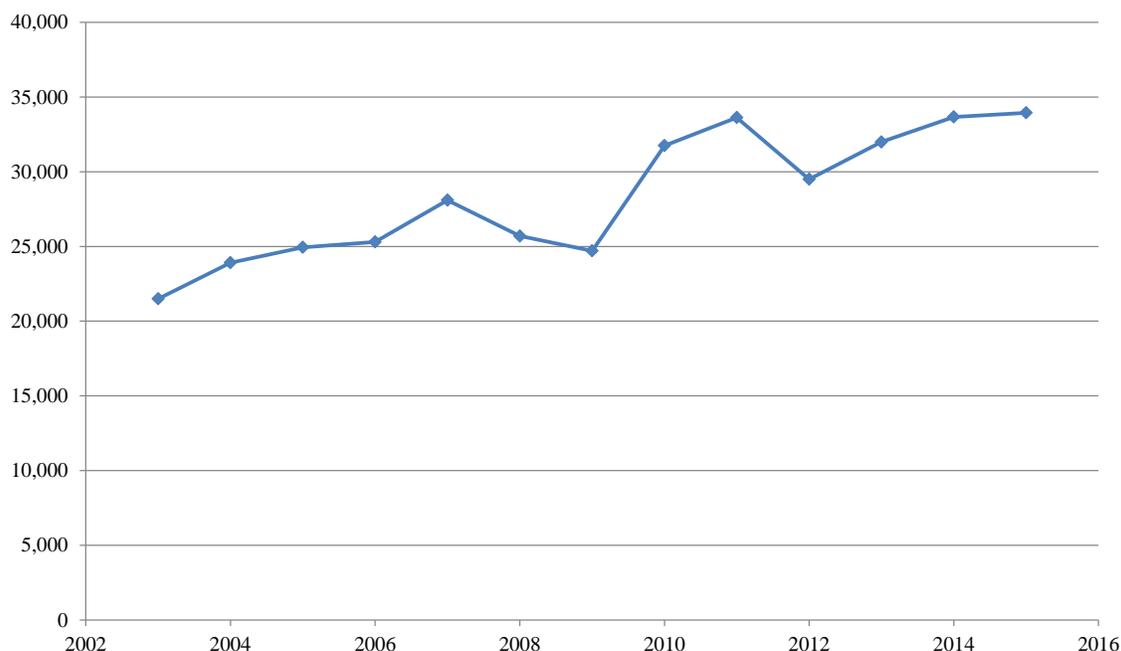
¹ The views expressed in this paper are those of the author and do not necessarily reflect the views of FINRA or of the author's colleagues on FINRA staff.

² See, for example, Adrian, et al. Federal Reserve Bank of New York (2015).

³ Sarah Krouse, "[Record Year for U.S. Corporate Bond Deals](#)," *Wall Street Journal*, September 25, 2015.

Figure 1 depicts the impact of increasing issuance activity in the secondary market by plotting the number of CUSIPs traded per year as reported in TRACE since these data have been collected. There have been 33,945 distinct CUSIPs traded in just the first nine months of 2015, almost 5,000 more than traded in 2007 and 12,000 more issues than were traded in 2003.

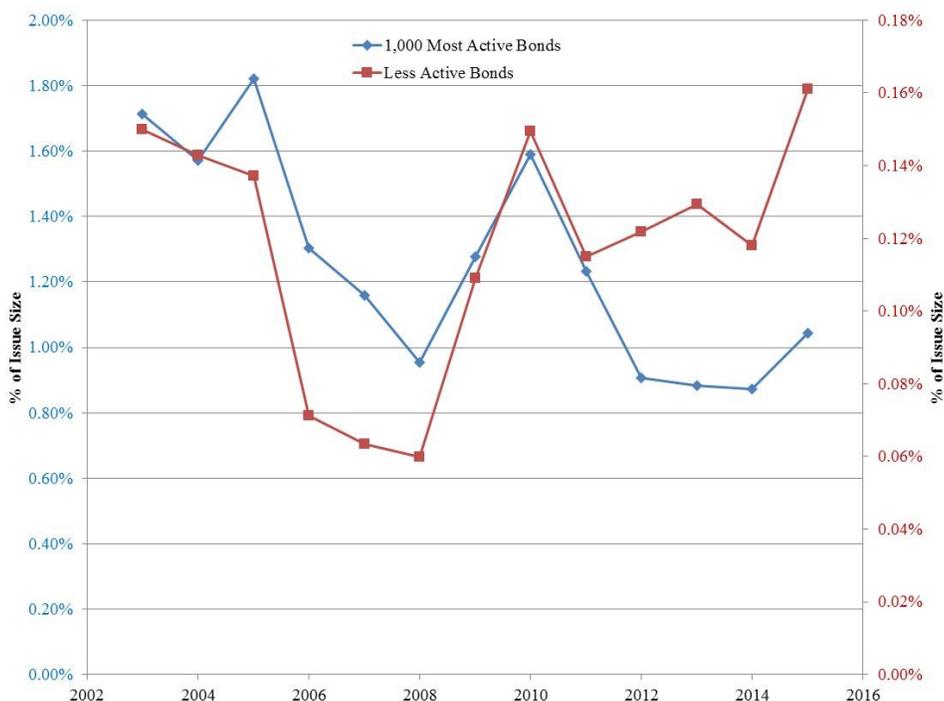
Figure 1: Number of Unique Corporate Bonds Traded in Secondary Market



Market participants have expressed concern about the ability to trade out of a given position, especially in light of the reduction in dealer inventories.⁴ We can measure this indirectly by looking at turnover, measured as the percent of an issue that trades on a given day, as reported in TRACE corporate bond data. **Figure 2** plots the median daily turnover ratio in the most active 1,000 issues for each year, as well as the turnover in the expanding portfolio of remaining securities.

⁴ This refers to instances where a dealer may purchase a large position from an institutional client and then seeks to reduce its own exposure by reselling the bonds, typically in smaller transactions, to other investors. See Fender and Lewrick (2015), *Bank for International Settlements*.

Figure 2: Median Daily Turnover (% of Issue)



Among the most active 1,000 securities, there appears to be a long-run drift downward in turnover, albeit with a spike post-crisis. Median turnover has fallen from a high of 1.8% in 2005 to just over 1% in 2015, implying that it now takes 100 days to trade a par volume equal to the issue size. The turnover ratio has risen in 2015 though, reversing a three-year decline.

Despite the long tail in the number of corporate issues, the turnover in the less active securities has risen to its highest level. But trades in these securities still represent a small fraction of the outstanding. It takes nearly six times as long to trade out of a less active security compared to a bond in the more active 1,000.

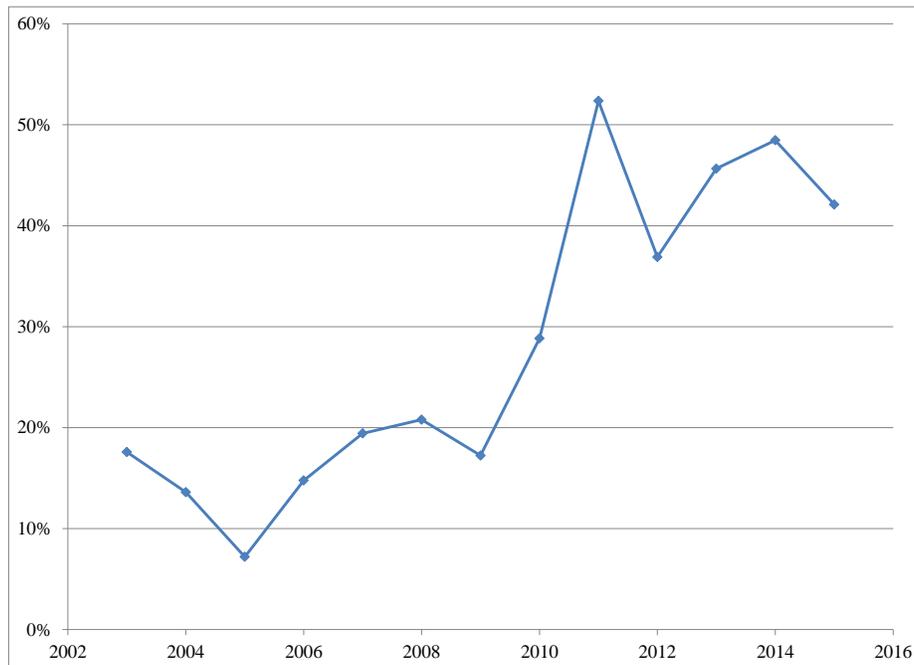
3. Characteristics of the Active and Less Active Securities

(a) Trading activity in new issues

The growing supply of new issues in the market appears to have concentrated trading in the secondary market on the most recently issued securities.

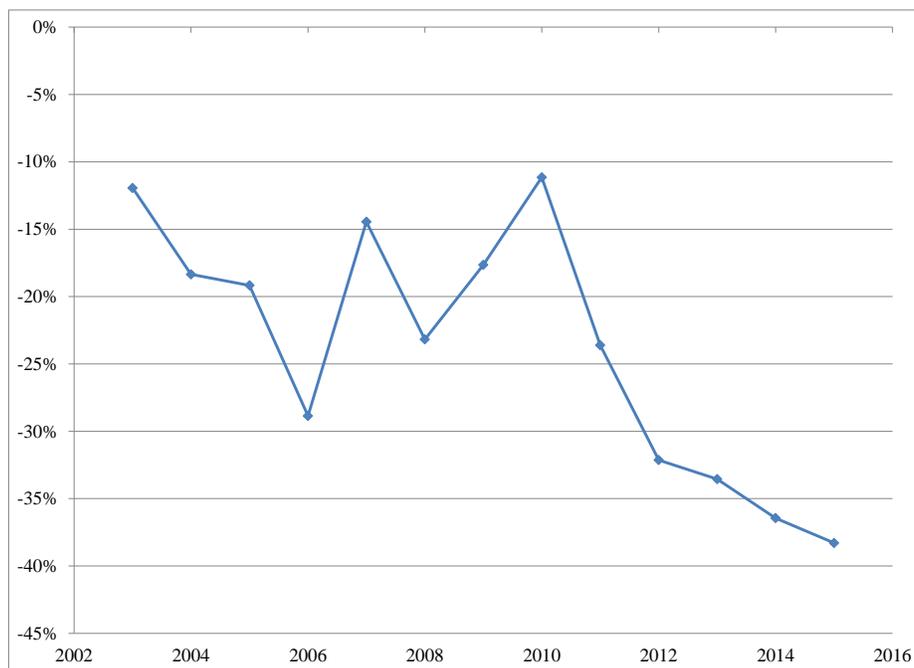
Figure 3 plots the average annual percentage of bonds among the most active 1,000 that were issued within the last 90 days on a rolling basis. Between 2003 and 2007, the percentage of newly issued bonds remained below 20%. Since 2011, newly issued bonds represent an average of 45% of the most actively traded portion of the secondary market.

Figure 3: Percentage of Most Actively Traded Bonds Issued in the Last 90 Days



The continuing flow of new corporate issues into the market is also associated with a sharp decrease in the trading of more seasoned issues. **Figure 4** reports the decline in the par value of trading volume among active issues after they have been in the secondary market for 90 days.

Figure 4: Trading Volume Reduction After 90 Days in the Secondary Market



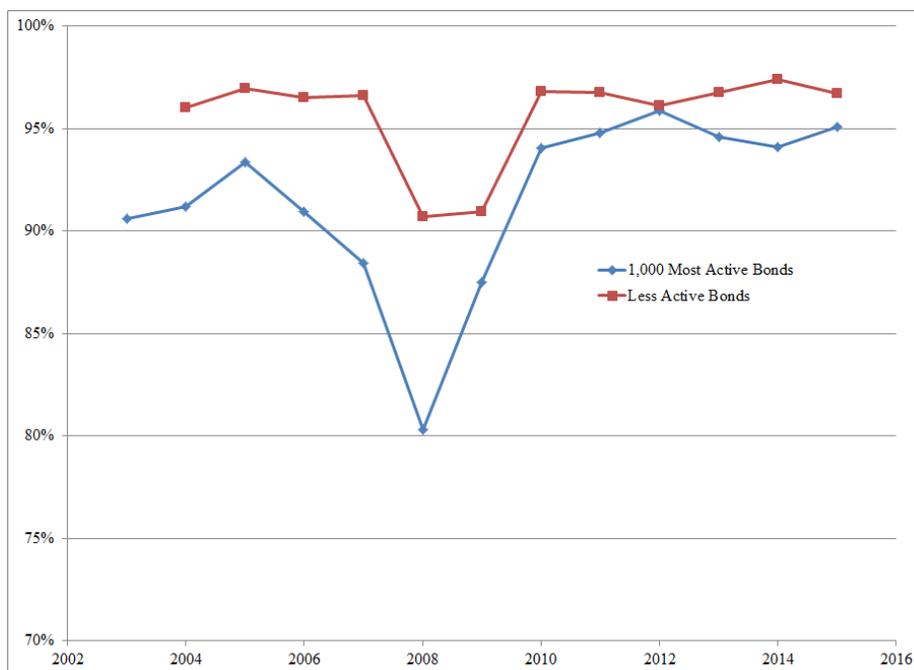
After their first 90 days in the secondary market, par trading volume in corporate bonds fell by 38% in 2015. This reduction in trading volume is 250% faster than occurred in 2007 (14.5% decline in trading volume).

(b) Credit quality

It is common for market participants to segregate corporate bonds by their credit risk, typically into investment grade (IG) and high yield (HY) instruments from different trading desks. In this section, we examine whether active trading may be an instrument to capture difference in credit quality risk across corporate bonds.

Figure 5 plots the percentage of investment grade securities in the actively traded and less actively traded category. Each group is made up of more than 90% investment grade (IG) securities since 2010. The ratio of IG bonds in the active and less active portfolios dip slightly for the most active group during the financial crisis. The ratio for the less active group also drops during that time, but it never falls below 90%.

Figure 5: Percentage of Investment Grade Bonds in Each Trading Activity Group



Within the actively traded bonds, the most common credit rating is BBB. On average, 26% of the most active bonds are rated BBB. Within the less active category, the most frequently observed credit rating is A. On average, 35% of the bonds in the less active category have that rating.

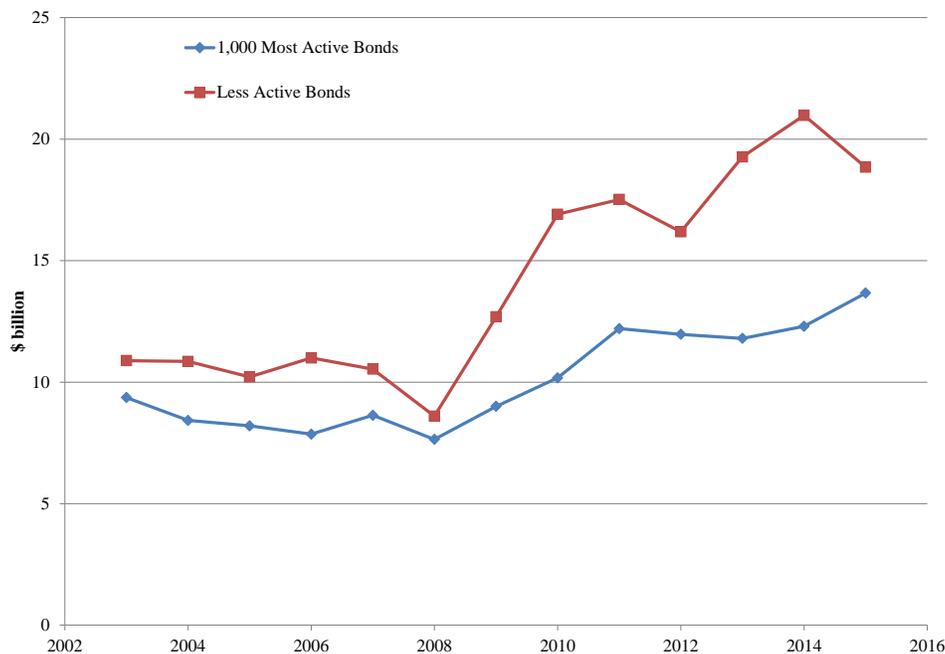
To the extent that the analysis presented here finds differences in the market behaviors for actively traded and less actively traded bonds, those differences do not appear to be driven by differences in credit quality across the portfolios.

4. Trades and Volume

The corporate bond market continues to grow overall. Total par bond trading volume in the secondary market reported to TRACE has already reached \$7.7 trillion in the first three quarters of 2015. It is on pace to be the most active year ever.

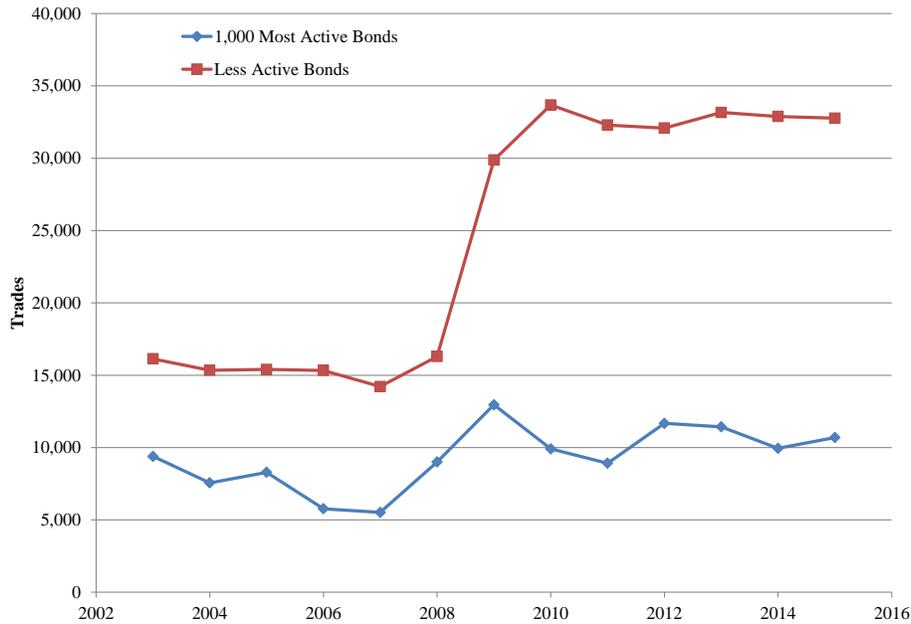
Figure 6 shows the daily average trading volume for the period 2003-2015. Apart from the slow steady growth in the average trading volume, the graph shows a shift toward increased activity in the broader market and away from trading concentration in the most active bonds. In 2010, for the first time, the total par volume traded outside the top 1,000 was \$5 billion higher than that in the most active issues.

Figure 6: Daily Average Par Trading Volume



The total number of trades also continues to rise. **Figure 7** graphs the daily average number of trades which reached over 43,000 in 2015. There are many more trades in corporate bonds outside of the top 1,000 issues. Trading activity, measured in this way, has particularly accelerated as the financial crisis eased in 2010. Note, however, this analysis is strictly measured in the number of trades and not the trade size or par value traded (see discussion below).

Figure 7: Daily Average Number of Trades



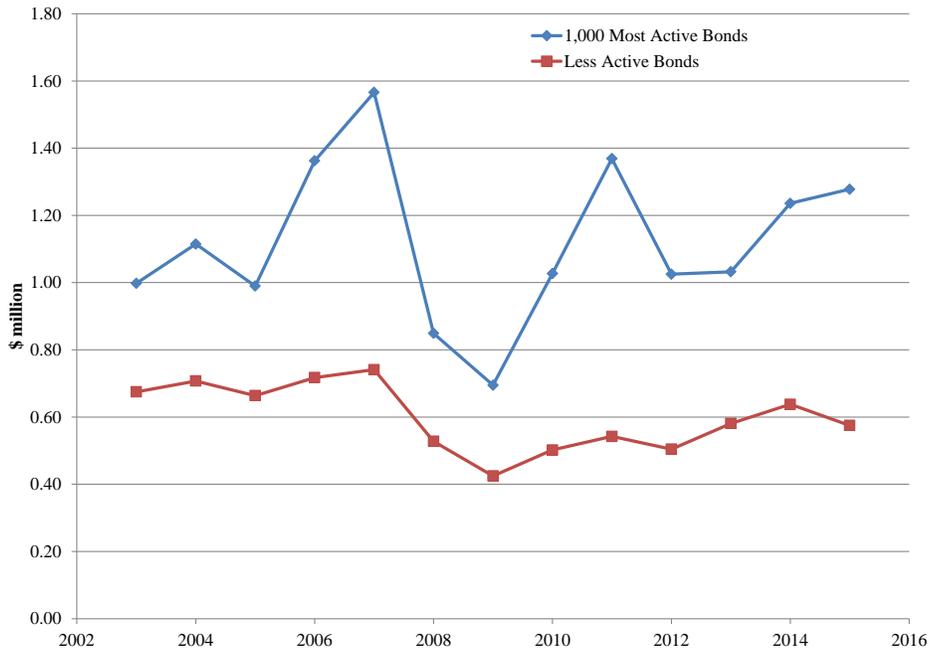
5. Average Trade Size and Block Trades

Figure 8 plots the average trade size over the sample period and shows the decline in trade size that followed the financial crisis.

The relative decrease in trade size is concomitant with a significant increase in smaller trades, which we believe is associated with a significant increase in retail participation immediately post-crisis. In 2007, there were 4.93 million trades of \$250,000 in par value or less. By 2014, this number had more than doubled to 10.49 million. Even for the most actively traded segment, trade size fell below \$1 million in 2008-2009. It has bounced back, but average trade size in the 1,000 most active issues is down more than a third since 2006.

The decline in the average trade size in the less active segment has been less severe, and the trend toward increasing trade size since 2009 appears to be continuing. But this measure is still down over \$150,000 since 2007.

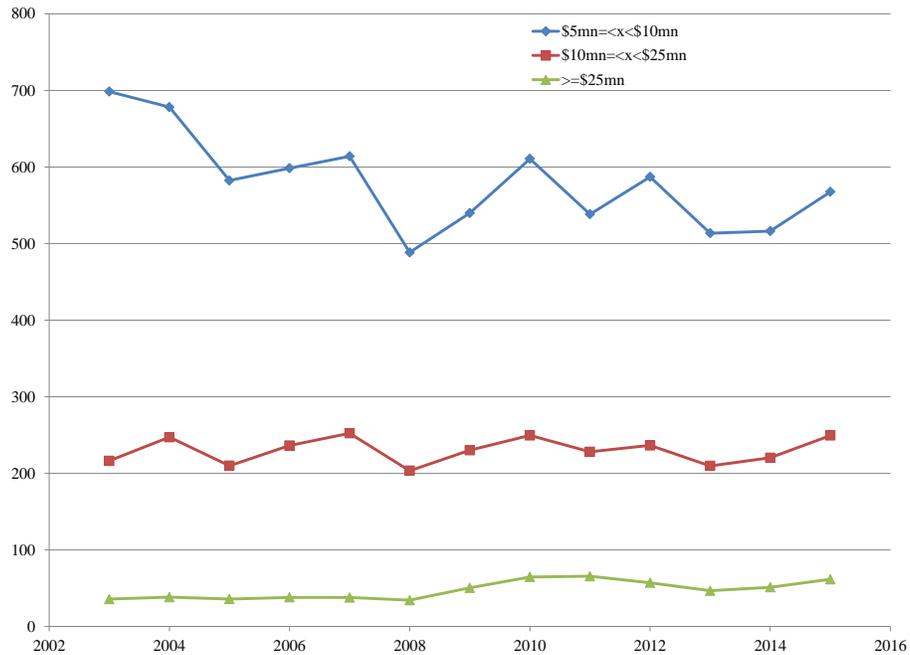
Figure 8: Average Trade Size



To assess the liquidity for more institutional clients, we analyzed the incidence of block trades. For this analysis, block trades are defined as any trade of \$5 million or greater. The analysis segments block trades into three groups: trades of at least \$5 million and less than \$10 million, trades of at least \$10 million and less than \$25 million, and trades of at least \$25 million and greater.

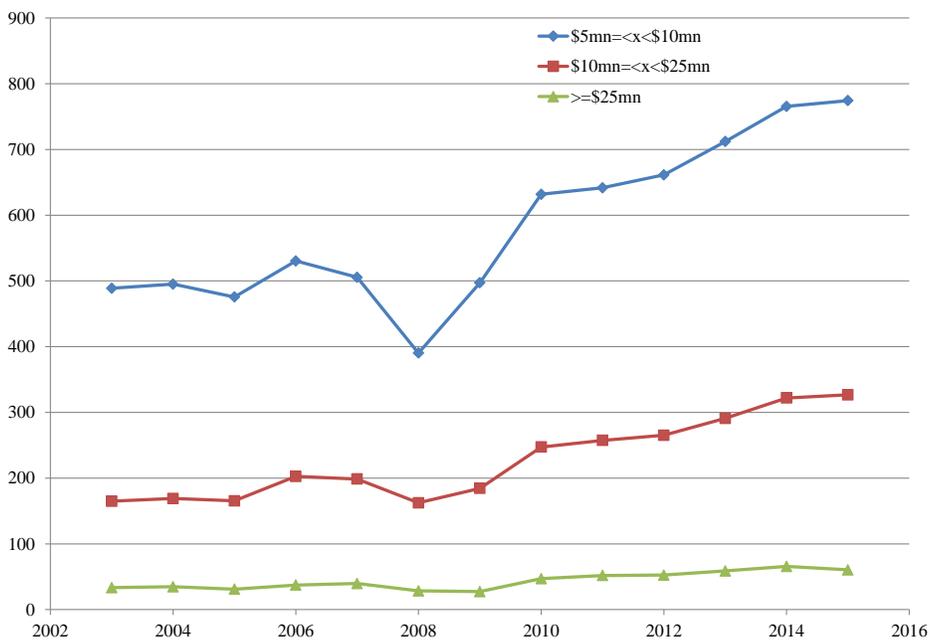
The number of block trades in the most actively traded bonds, graphed in **Figure 9**, has remained relatively stable when taken as a whole. In the \$5 to \$10 million size bucket, there are more than 100 fewer block trades per day than occurred in 2003. The larger block sizes do not show any downtrend. Block trading levels in 2015 represent near record high totals for both the \$10 to \$25 million, and the \$25 million and up category.

Figure 9: Number of Block Trades per Day in Active Bonds



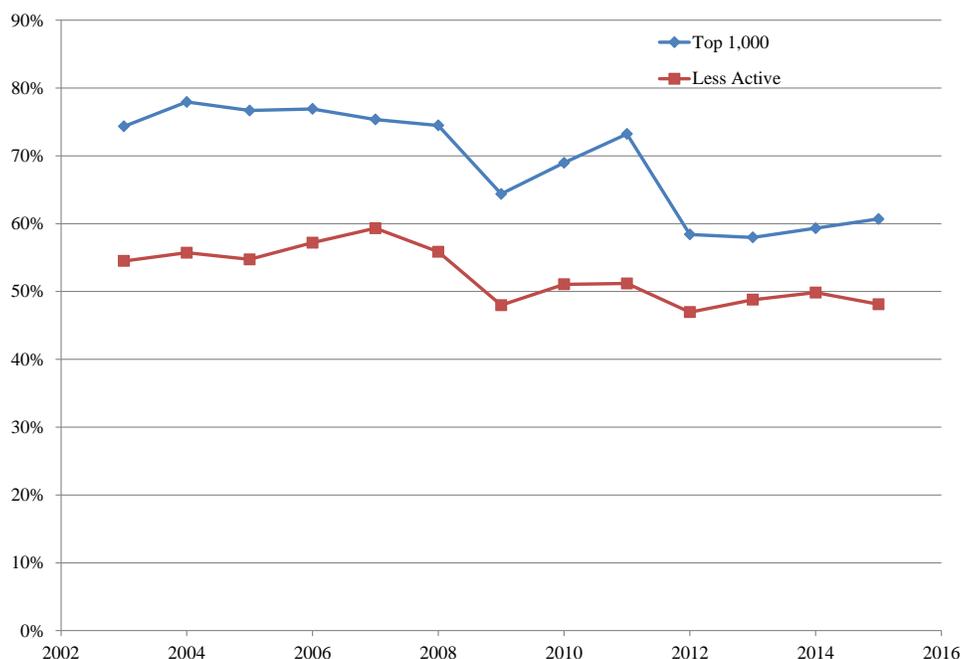
The number of block trades in the less active names shows a steady uptrend for all block trades. **Figure 10** shows that 2015 recorded the highest level of block trading since TRACE began in 2003 for the two smaller block trade sizes. In the \$25 million and over category, both 2014 and 2015 recorded the highest levels of block trades in the 12 years of TRACE data.

Figure 10: Number of Block Trades per Day in Less Active Bonds



Block trades might be rising simply as the market is growing, so to explore this further, par value of block trade activity is adjusted by total par bond trading volume in **Figure 11**. The chart confirms that a relatively smaller percentage of trading is occurring in the larger block sizes in recent years.

Figure 11: Proportion of Volume in Block Trades

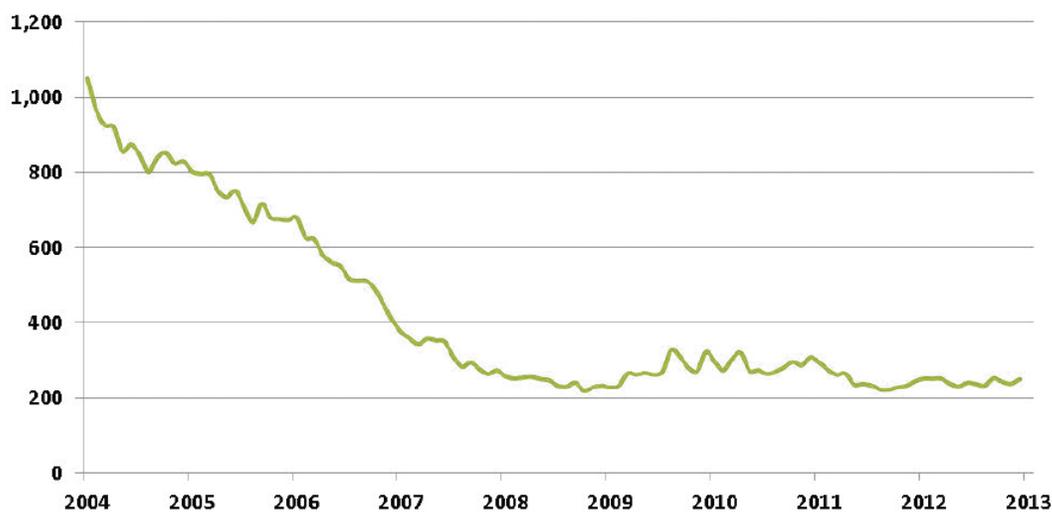


As **Figure 11** shows, the relative decline in block trading to total volume is more pronounced in the more active category. These findings are consistent with industry feedback that it is becoming more difficult to execute block sized trades in the current market.

6. Trends in Trade Size in Equity Markets

To better understand the trends in trading size in corporate debt securities, it may be instructive to compare the experience to equity markets. The equity market was the first market to move towards electronic and algorithmic trading. Because of a variety of differences between equity and debt markets, the equity experience is not completely analogous.

Figure 12: Average Trade Size in NYSE Listed Equities



Source: Angel, Harris and Spatt (2013)

The decline over the last decade, that Angel, Harris and Spatt (2013) document, is associated with a growing use of automated trading. Dealer relationships appear to have become less important as the desire and capacity to trade more quickly grew.

In this market, the decline in average trade size was not accompanied by deterioration in market quality. Trading volumes continued to grow, bid-ask spreads have narrowed, and transaction costs have continued to fall.⁵

7. Bid-Ask Spreads

One of the most important and useful measures for assessing the cost of liquidity is the bid-ask spread. The spread, which is generally paid by liquidity demanders, represents a good first order measure of the cost of trading for those bonds that do trade.

Because quotations for corporate bonds are not disseminated, traditional measures of bid-ask spreads in fixed income instruments cannot be observed directly, but have to be inferred from trades. We understand that even on the electronic trading platforms, buyers and sellers do not see bid-ask prices.

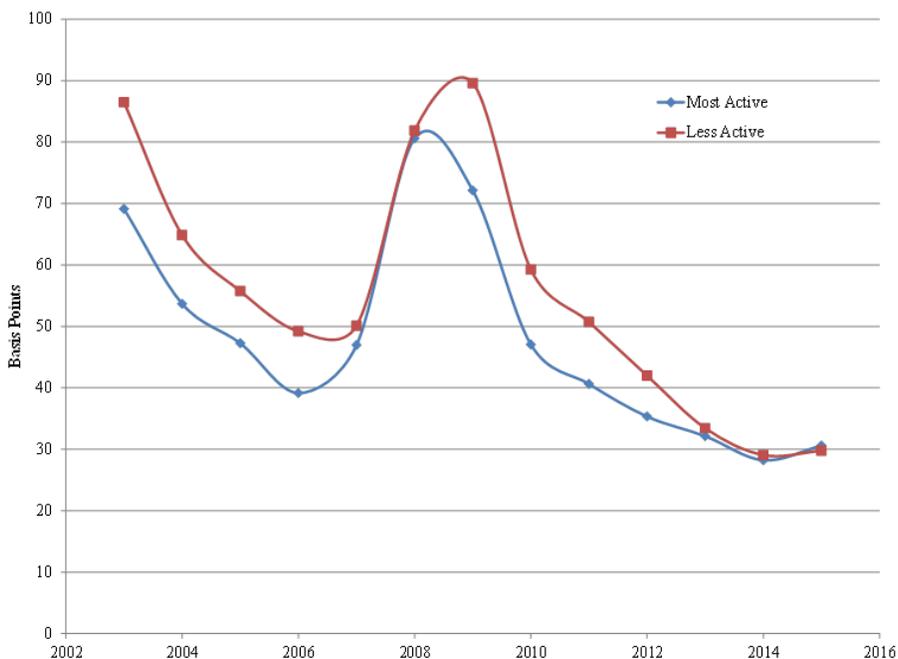
A standard method to estimate bid-ask spreads from transactions data is the Thompson-Waller (TW) (1988) estimator that has been widely used in academic literature.⁶ The TW estimator takes the average of the non-zero price changes in the transactions data. The idea is that price

⁵ Hendershott, Jones and Menkveld (2011).

⁶ See, eg., Bryant and Haigh (2004), who apply the estimator to a large number of commodity futures markets.

changes will typically reflect either movement across the spread or through the limit order book. It is important that transactions be sequenced properly, and for this reason and consistent with the typical estimation approach, all the non-standard trades in TRACE are filtered out for this analysis.⁷

Figure 13: Bid-Ask Spreads 2003-2015



Estimates of bid-ask spreads (reported in **Figure 13**) have fallen steadily since trades began to be disseminated through TRACE, except in 2007-2008.⁸ Since then, the estimates of bid-ask spreads have resumed their decline and reached record lows in 2014. There has been a slight increase in 2015, but it is estimated to be under two basis points in both market segments.

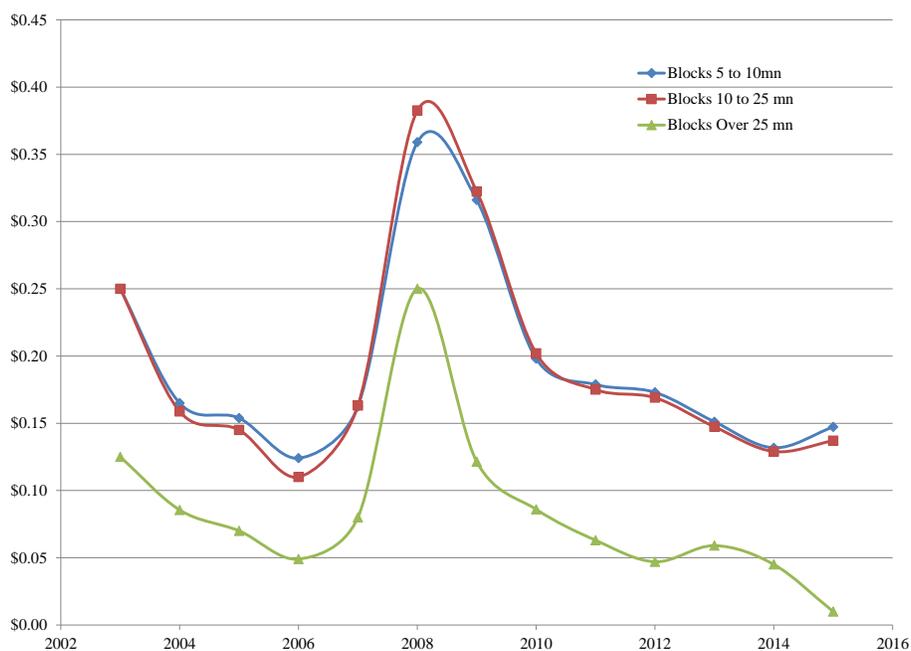
8. Trading Costs

The bid-ask spread analysis provided above does not discriminate with respect to trade size. To understand more directly whether block trades are more costly in the current environment, a measure of the price impact of block trades is estimated by calculating how much a given transaction will change the prevailing price for the asset in the market. Trades with higher price impact move the price in the direction of the transaction and hence may impact the supply and demand for the asset. Hence, a dealer whose purchase of a large block of bonds has a large market impact may find it harder to find buyers if the dealer wishes to reduce its exposure. To provide some context to this concern, **Figure 14** depicts the immediate price impact of block executions of different sizes.

⁷ The analysis specifically filters out trades that are not during market hours or not reported in sequence.

⁸ This extends the result of Edwards, Harris and Piwowar (2007) that showed spreads fell steadily upon the introduction of TRACE in 2002.

Figure 14: Immediate Price Impact of Blocks



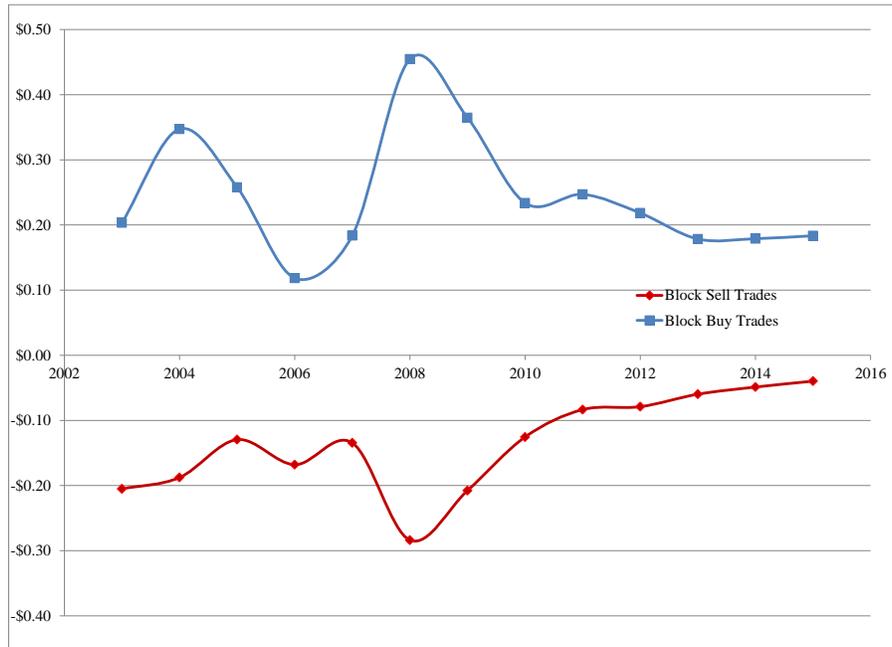
The figure shows the median increase (decrease) in the price of a trade immediately following a block buy (sell) order. At the initiation of TRACE dissemination in 2003, a typical \$10 million block purchase would move the market price about \$0.25. The market impact of block trades nearly reached \$0.40 during the financial crisis, but it returned to pre-crisis levels by 2011 and has continued to steadily decline. The variation in estimated price impact to block trading over the history of TRACE would seem to suggest that market volatility has a likely much greater effect on market impact than post-trade dissemination.

The concerns about reporting to TRACE are typically related to the ability of a dealer to hedge out of the block trade, *i.e.*, to reduce the dealers' exposure to the bond after purchase. **Figure 15** addresses those concerns by plotting the price change five trades after the block is reported or the last trade of the day, whichever comes first.⁹ The figure shows that by five trades¹⁰, the price impact of the initial trade has reversed. A dealer who shorts (goes long) to absorb a block buy (sell) will on average see prices fall by -\$0.04 (rise by \$0.18) in 2015. In comparison, a dealer conducting the same activity in 2012 would have seen prices fall by -\$0.08 (rise by \$0.22) after five trades. The analysis suggests that any price impacts associated with the size of the trade are on average transitory. We caution that this fact does not imply that the dealer block transaction was or was not profitable.

⁹ Dealers have concerns about being "adversely selected" which occurs when the trader has more information about the security than the dealer. If prices continued moving in the direction of the initial price change, this would be evidence of adverse selection. In the data analyzed, prices generally *reverse* after the initial price change. This allows the dealer to hedge out any remaining inventory imbalance without an adverse impact on his hedging costs. On average, these five trades occur more than 104 minutes after the block is reported, so there also appears to be ample time to hedge as well.

¹⁰ The results are robust to both longer and shorter trade intervals.

Figure 15: Market Impact After Block Trade

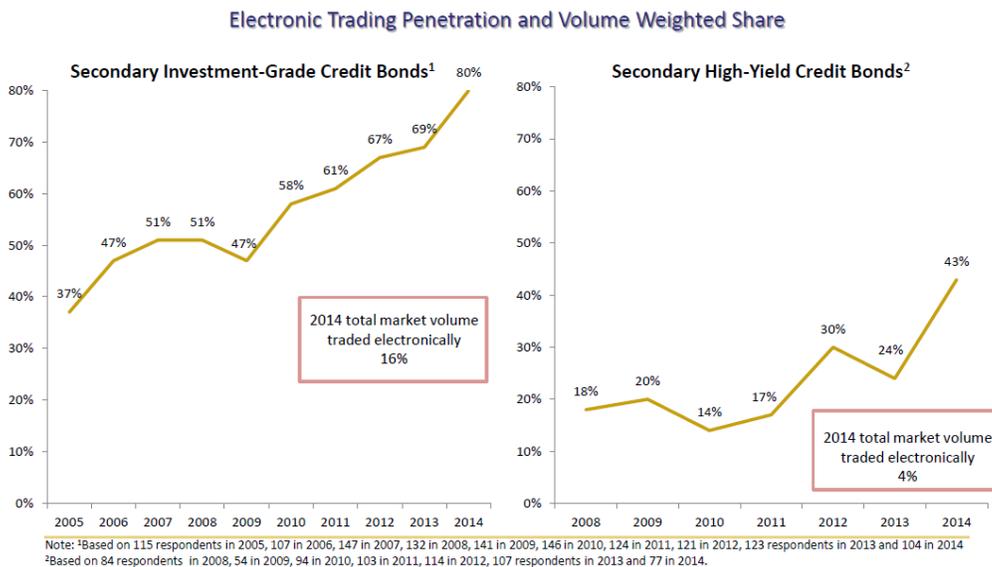


9. Changes in Market Structure

(a) Electronic trading

The analysis of the impact of electronic trading relies on survey data from Greenwich Associates (2015).

Figure 16: Survey Data on Electronic Corporate Bond Trading



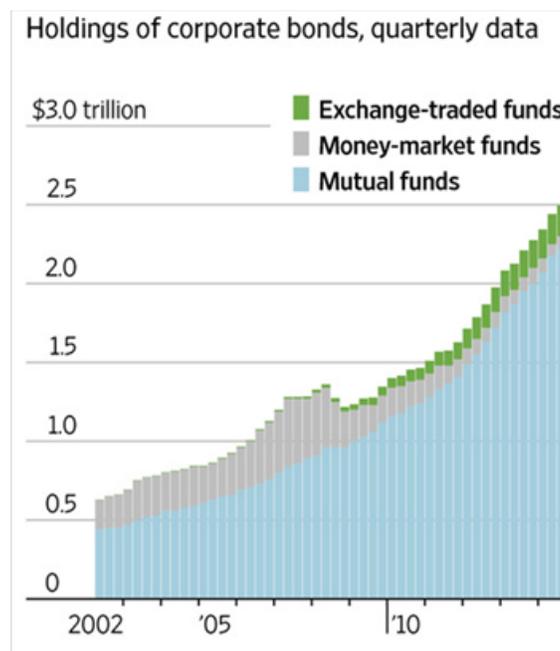
The survey data¹¹ graphed in **Figure 16** indicates that in both investment grade bonds and high yields, electronic trading has expanded beyond the 1,000 most actives issues. In 2014, 80% of investment grade bond market participants surveyed used electronic platforms as part of their trading. This usage can include a variety of activities, including seeking quotes, posting quotes or conducting actual trades.

While electronic markets appear to be a more common tool for dealers in the corporate bond market, they still represent a limited portion of the actual trading activity. The 16% volume weighted share of electronic trading is still well behind the levels in equities or U.S. Treasuries, but these other markets are likely pointing the way.

(b) Changes in buy-side participants

Credit ETF assets have grown explosively since the financial crisis. Based on data from ICI, assets under management, graphed in **Figure 17**, have risen from under \$10 billion to over \$100 billion since 2008. They continue to represent just a small fraction of debt market exposures, just over \$111 billion in 2014.

Figure 17: Holdings of Corporate Bonds



Source: *WSJ* March 18, 2015, Data from ICI

Mutual funds, which do not provide intra-daily liquidity, remain the predominant holders of credit instruments.

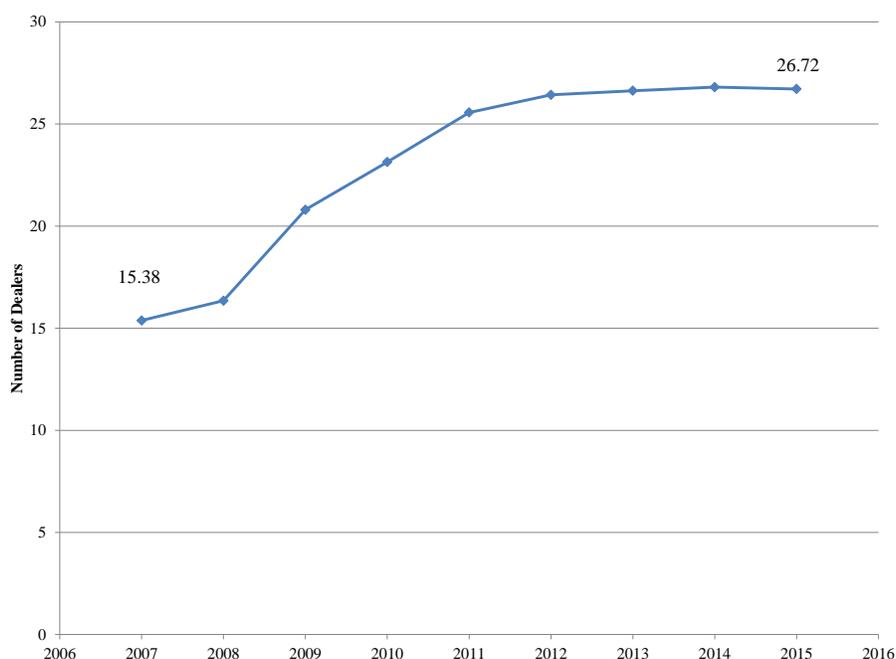
¹¹ Greenwich Associates conducts annual surveys of institutional traders in fixed income including mutual funds, pension funds, hedge funds, insurance companies and banks.

(c) Counterparties

Data indicate that dealers are interacting among a larger group of counterparties in the last three years. **Figure 18** plots a simple measure of dealer networks, the average number of dealer-to-dealer counterparties reported in TRACE.

In 2007, a dealer only traded with 15.38 counterparties on average. By 2012, this had risen to more than 26, an increase of almost 70%. This number has remained stable over the last three years even as the total number of dealers has declined.

Figure 18: Average Number of Counterparties per Dealer



The top ten dealers, as measured by the par volume of TRACE reported trades, are at the center of much larger networks. These dealers accounted for approximately 55.18% of trading volume in 2007 and 58 to 61% of the trading volume over the last three years.¹² In 2007, the top ten dealers traded with an average of 245 counterparties; in 2015, the average network size has grown to 287.

Dealers appear to source more counterparties to make trades, and this is reflected in the growing size of dealer networks. This may be a reflection of reduced costs in identifying counterparties, *e.g.*, through better technology, reduced abilities of counterparties to absorb any dealer's trading demands, or some combination of these and other effects.

¹² Further, in recent years, names in the top ten list have remained stable as well. Only eleven firms are represented in the top ten dealers since 2013. Seven of the ten were also among the leaders in 2007.

10. Segmented Risks

As part of FINRA's efforts to better understand the current conditions of the corporate debt market, staff engaged in outreach to market participants who represented a fair cross-section of activities and business models. Some of these participants identified certain areas of the corporate bond market that they felt were either under significantly larger strain or better represented the strain on the market as a whole. In this section, we provide indicative evidence of the conditions in these segments, relying on the same liquidity measures used above.

(a) 144A securities

In the second half of 2014, FINRA began to disseminate data on 144A securities. These are sales of restricted corporate debt securities to large institutions acting as Qualified Institutional Buyers (QIBs). They comprise nearly 20 percent of the average daily volume in the corporate debt market as a whole. Because 144A securities are not available to all investors, particularly retail investors, the liquidity available to these securities may be inherently different in the current market.

Public data exist only for the first three quarters of 2015 to analyze. In general, there is no evidence of a substantial difference in the liquidity of this market segment, but the sample size is still too small to reach reliable conclusions.

In 144A corporate debt securities, 3,778 CUSIPs have traded so far in 2015. Average trade size is \$2.45 million, more than double the average size in the active segment of the market.

Estimated bid-ask spreads are almost exactly 30 basis points, and virtually identical to the average for the market as a whole.

(b) Bonds trading at a discount to par

A number of market participants noted that bonds trading at a discount to par value represented a segment of the corporate bond market under significant liquidity constraints currently. These bonds may represent securities with a higher risk of credit downgrade, which in turn may affect demand. For the year 2015, through September 30, 6,975 different corporate debt securities have traded at prices below the \$95 threshold. Only 123 of these securities are among the 1,000 most active.

These bonds are more illiquid by the measures introduced here. They have a median bid-ask spread of 66 basis points, more than double the typical security. Median trade size is \$267,000, more than 15% lower than the median for other less active securities.

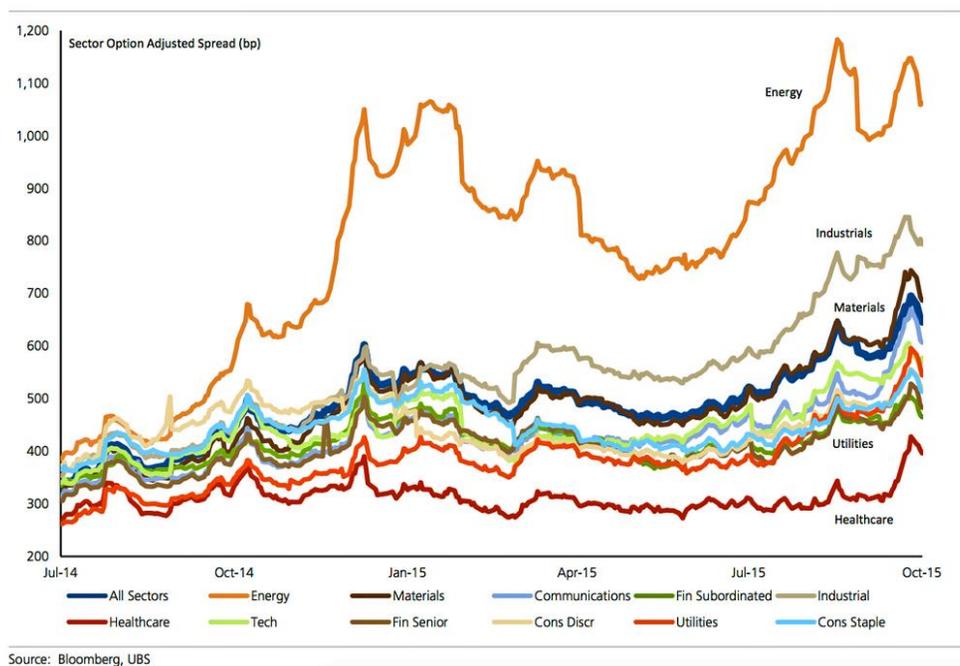
(c) Industry sector specific risk

Global corporate bond issuance hit a low for the year in August 2015 in part due to the market volatility in China and the U.S. investment grade issuance is down 5% from 2014 and high yield is down 20%.¹³

Specific sectors, however, have been hit particularly hard. The U.S. oil and gas sector issued only \$3.2 billion in new high yield bonds in the third quarter of 2015, down from over \$15 billion in the third quarter of 2014.

Credit quality of existing bonds has also deteriorated. In the third quarter of 2015, 40% of the downgrades by Fitch were in the energy sector. Credit spreads in high yield bonds, graphed by sector in **Figure 19**, indicate that this stress is particularly acute in the energy sector and may be spreading into other sectors.

Figure 19: Spreads by Sector for U.S. High Yield Market



11. Volatility in Bond ETFs

On August 24, 2015, the equity markets had one of their most volatile days since the Flash Crash (May 6, 2010). This volatility was particularly acute in exchange traded funds, even the most liquid ones.

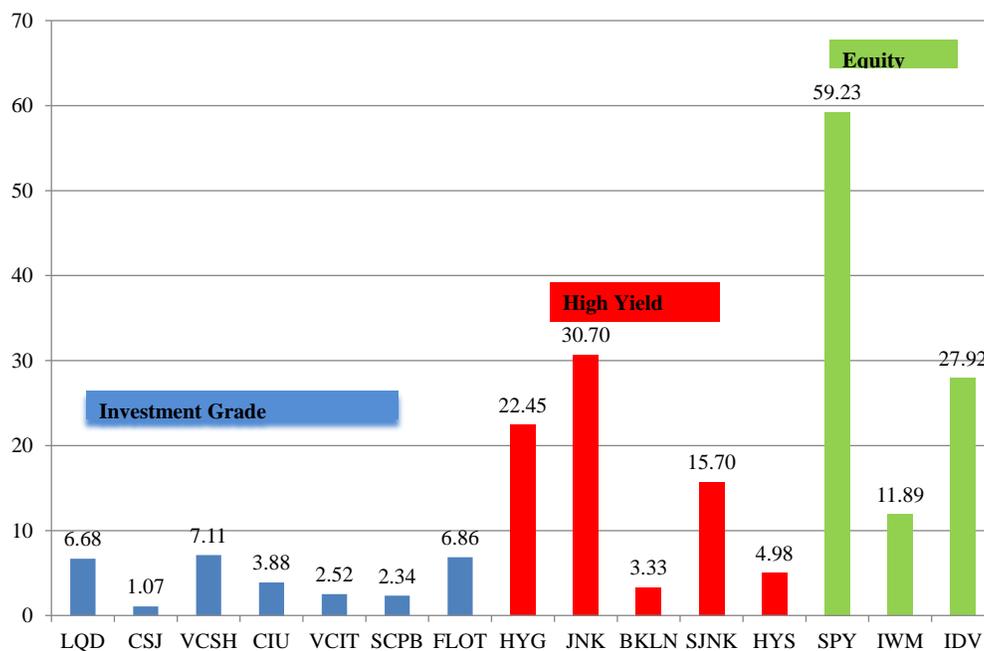
For example, the SPDR S&P 500 ETF (SPY), the State Street ETF which tracks the S&P 500 index and has more than \$150 billion in assets, traded in a range between \$189 and \$197 on

¹³ Thomson Reuters: *Corporate Bond Monthly* September 2015.

August 24. Perhaps more importantly, its price strongly deviated from its underlying index during the early part of the trading day. This experience was shared by a large number of ETFs on that day.

Realized volatility is estimated as the square of the 5-minute returns in several ETFs over the trading day. The analysis compares the realized volatility on August 24 to the prior Monday, August 17. SPY volatility, as can be seen in **Figure 20**, rose almost 60 times relative to the “normal” day.¹⁴

Figure 20: Realized Volatility Increase Aug 24/Aug.17



For comparison, a more heavily retail index, the iShares International Select Dividend ETF (IDV) and the iShares Russell 2000 ETF (IWM), an index tracking smaller stocks, are included in the graph.

This ratio of realized volatility is also compared across the seven investment grade bond funds with \$1 billion in assets or more. These funds, shaded in blue, fared much better than the equity index ETFs. The largest increase, in the Vanguard Short-Term Corporate Bond ETF (VCSH), was only about seven times.

High yield bond funds performed comparably to the IWM ETF. Of the five funds with more than \$1 billion in assets, their volatility rose by about 15 times on average. The SPDR Barclays High Yield Bond ETF (JNK) fared the worst, with a volatility increase of over 30 times.

¹⁴ This day is chosen as a representative trading day as a control. The same day of the week is chosen to control for any regularities that might occur in trading. The CBOE VIX opened at 14.32 on August 17, 2015, 0.6 points below the 200-day moving average, suggesting that it a reasonable benchmark day.

10. Conclusions

Some industry participants have become alarmed about the decline in liquidity in the corporate bond market.¹⁵

Based primarily on evidence collected by FINRA through TRACE, there does not appear to be strong evidence to support this view. New issuance is strong, secondary market trading volume continues to rise and bid-ask spreads continue to fall.

However, there is evidence that finding liquidity is now associated with smaller trade sizes, more transactions and larger dealer networks. While the absolute number of block trades continues to increase, the proportion of block trades to total volume is also falling as is the average trade size. Further, electronic trading in corporate debt securities continues to grow although these trades still represent a small fraction of overall volume.

These structural changes have occurred in other markets as well and may provide some perspective. In the equity markets, average trade size fell from over 1,000 shares to 200 shares in just five years.

There are also several new risks to the market. These include the volatility of bond ETFs and the sector specific problems in high yield originating in the energy sector. Both will require further scrutiny and analysis.

¹⁵For example, one market participant wrote a viewpoint piece in September 2014 stating that “We believe that the secondary trading environment for corporate bonds today is broken...”

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