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How Post-2008 Financial Regulations Impacted Corporate Bond Liquidity

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We review empirical findings regarding the impact of post-2008 financial regulations on the liquidity of corporate bond markets in the U.S. We first show that traditional measures of market liquidity improved in recent years. At the same time, the cost of illiquidity also increased. We then discuss findings showing that — after the regulations were implemented — dealer capital commitment, trade frequency and size decreased, while dealer bid-ask spread increased. The increase in dealer bid-ask spread is compensated by a change in the composition of the liquidity provision. Liquidity is increasingly being provided by customers instead of dealers.

In the aftermath of the 2007-2009 financial crisis, several governments enacted regulations to help protect economies from future financial crises. The U.S., in particular, enacted the Dodd-Frank Wall Street Reform and Consumer Protection Act in 2010. To some extent, the Dodd-Frank Act and similar regulations in other countries accomplished their goal. This was highlighted by how resilient the financial sector has been to the economic fluctuations caused by the pandemic.

However, a major focus of academics, practitioners and government officials has been measuring how such regulations affect the financial sector in normal times. For example, during a 2015 congressional hearing, Rep. French Hill questioned then-Federal Reserve Chair Janet Yellen on whether regulations were to blame for the deterioration of liquidity on different bond markets. Yellen replied:

> *"I am not ruling out the possibility that regulations could play a role here, it is simply we have not been able to understand through a lot of different factors and we need to look at it more to sort out just what is going on and what the different influences are, but I am*

not ruling that out."

In this article, we review two empirical findings on corporate bond markets from our work in progress "Dealer Balance-Sheet Costs and Customer Counterpart Choice." The first one is that traditional measures of market liquidity have on average improved after the financial crisis. (This has also been documented in work such as the 2018 paper "Capital Commitment and Illiquidity in Corporate Bonds.") This finding could suggest that regulations had a minor impact on financial market liquidity.

However, we then show that the cost of illiquidity — measured by the impact of illiquidity on the yield spread of corporate bonds — also increased. In other words, while markets seem to be more liquid, the cost of illiquidity has increased.

We then discuss these two findings based on the model proposed in our paper and conclude that both the behavior of market illiquidity and its correlation with yield spreads can be rationalized by the new financial regulations in a traditional model of over-the-counter financial markets. The model builds on the 2005 paper "Over-the-Counter Markets" and has the 2009 paper "Liquidity in Asset Markets with Search Frictions" and the 2020 paper "Frictional Intermediation in Over-the-Counter Markets" as particular cases. The model is also consistent with empirical findings from the aforementioned 2018 paper "Capital Commitment and Illiquidity in Corporate Bonds" as well as the 2019 paper "Customer Liquidity Provision: Implications for Corporate Bond Transaction Costs," which show a decrease in dealer trade frequency and an increase in dealer bid-ask spread.

Data

We use the TRACE Enhanced (ETRACE) corporate bonds transaction database for the period January 2005 to June 2017. It provides 171,140,493 trades as well as 283,250 bonds with a unique identifier.[1] We clean the data using a procedure based on the 2009 paper "Liquidity Biases in TRACE" and the 2014 paper "How to Clean Enhanced TRACE Data."[2]

To avoid having many bonds in our sample that trade very infrequently, we follow the methodology used in the 2011 paper "The Illiquidity of Corporate Bonds" and the 2017 paper "Is Post-Crisis Bond Liquidity Lower?" We also add the following two conditions:

- The bond must have existed in ETRACE for at least one year.
- The bond must have traded on at least 75 percent of its relevant trading days.[3]

Having applied these trade-based criteria, we are left with 55,753,160 transactions in 5,410 unique issues.

We use Bloomberg to collect bond information on issuance dates, maturity dates, provisions, coupons, currency denomination, amount outstanding and ratings. We use the amount outstanding of each issue as of the last business day of each month. We consider a bond as investment grade if its rating is greater than or equal to BBB– from S&P and Fitch or Baa3 from Moody's. We prioritize the rating from S&P, then Fitch and then Moody's, depending on availability.[4]

We exclude trades that took place outside the range of issuance and maturity dates of an issue, and we exclude bonds for which the outstanding amount at the last business day of that specific month was zero. We also excluded bonds with missing information as well as defaulting bonds for as long as they are considered in default. We keep in our sample callable or non-provisional, fixed-rate bonds issued in the U.S. At this stage, our sample consists of 45,026,565 trades in 4,255 individual bonds.

As in the aforementioned 2011 paper "The Illiquidity of Corporate Bonds," we calculate the individual yield spread as the difference between the yield of the corporate bond and the yield of the government bond with the same maturity. The constant maturity yield curve is obtained from the Federal Reserve Bank of St. Louis FRED dataset. We use linear interpolation to calculate the yield of the government bond matching the exact maturity of the corporate bond. The monthly cross-sectional yield spread of a corporate bond is then calculated as the average daily spread in the month.

Illiquidity Measures

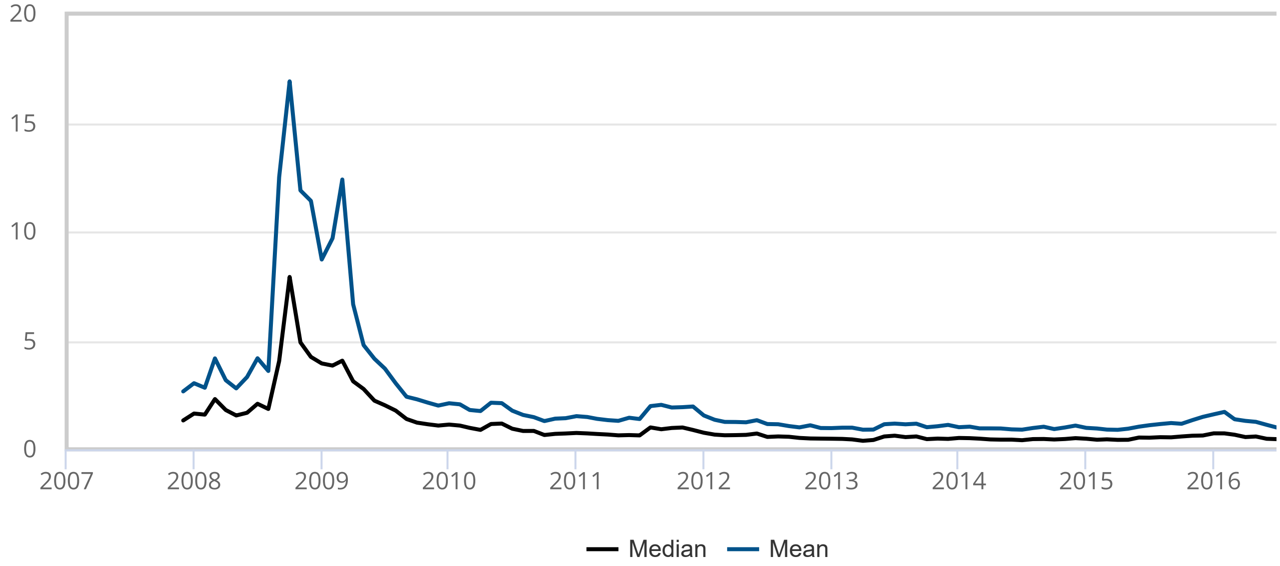
Illiquidity is usually defined as the deviation of the price of an asset from its fundamental value resulting from market frictions. We primarily use the illiquidity measure *y* proposed by the "The Illiquidity of Corporate Bonds" paper and based on the 1984 paper "A Simple Implicit Measure of the Effective Bid-Ask Spread in an Efficient Market" as well as the Amihud liquidity measure (AMD) proposed in the 2002 paper "Illiquidity and Stock Returns: Cross-Section and Time-Series Effects."

In the figures below, the *y* is the covariance of consecutive price changes and captures an implicit bid-ask spread. The AMD is the absolute value of trade-by-trade return-to-volume ratio and captures the price impact of a given transaction relative to its size.

Figures 1a and 1b depict the behavior of the mean and the median of the *y* and AMD illiquidity measures over the period December 2007 to June 2017.

Figure 1a: Time Series of γ Illiquidity Measures

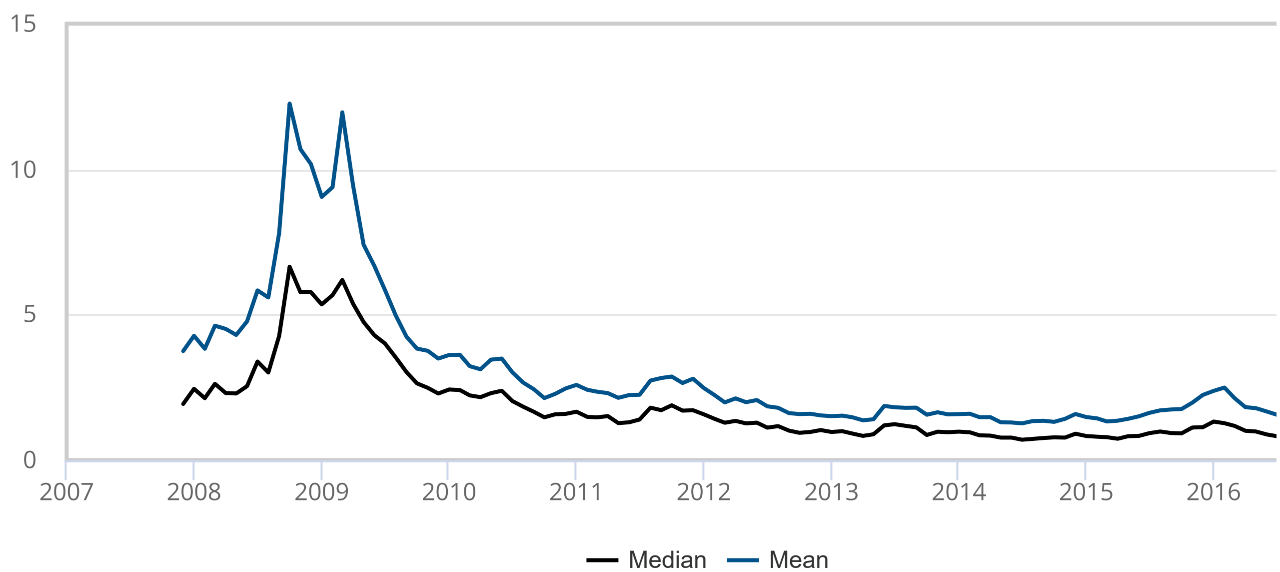
December 2007-June 2017



Source: The 2022 work in progress "The Impact of Post-2008 Financial Regulations on Corporate Bond Liquidity" by Lu
Dyskant, Andre C. Silva and Bruno Sultanum.

Figure 1b: Time Series of AMD Illiquidity Measures

December 2007-June 2017



Source: The 2022 work in progress "The Impact of Post-2008 Financial Regulations on Corporate Bond Liquidity" by Lu
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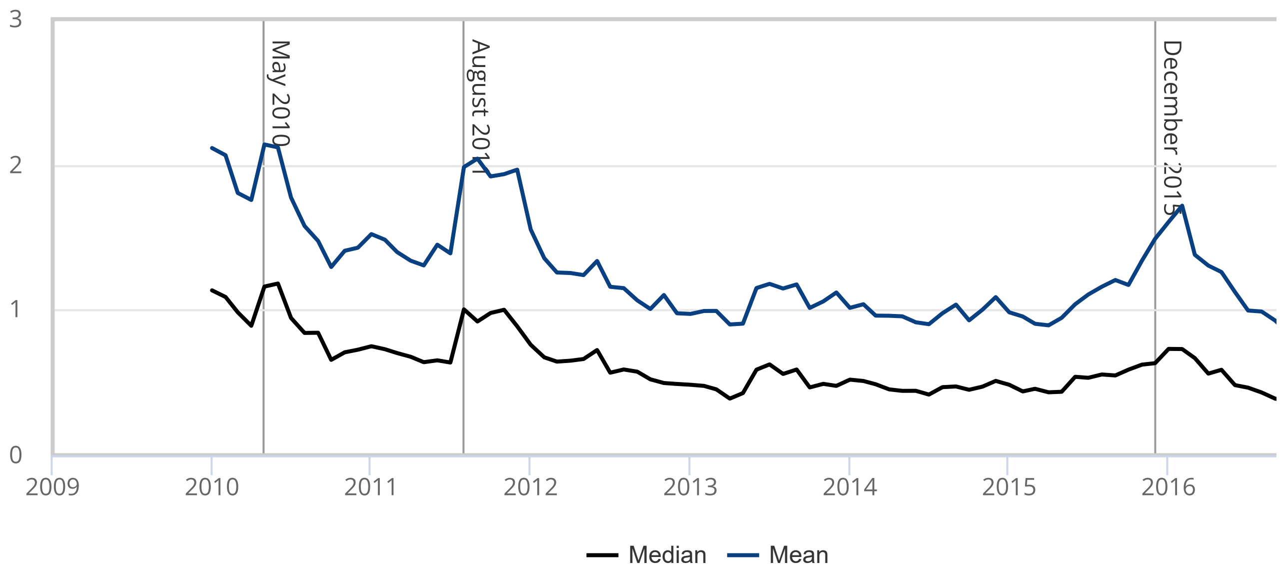
The measures peaked during the financial crisis and have since decreased, not only returning to the precrisis level but actually falling below it.

Figures 2a and 2b depict the time series of illiquidity measures since 2010. Both measures have been decreasing since the crisis. However, as identified in the figures, there were some periods in the time series in which the corporate debt market showed local peaks.

Figure 2a: Time Series of *γ* Illiquidity Measures

January 2010-June 2017



Source: The 2022 work in progress "The Impact of Post-2008 Financial Regulations on Corporate Bond Liquidity" by Lu
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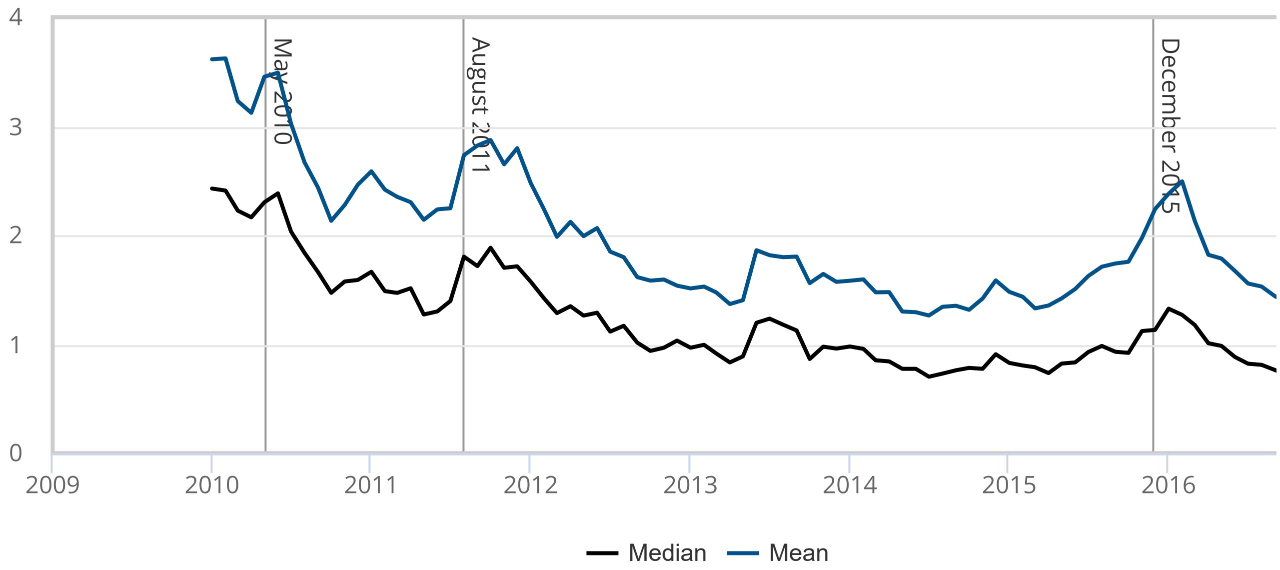
Figure 2b: Time Series of AMD Illiquidity Measures

January 2010-June 2017



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Three local peaks can be associated with events related to credit and regulatory changes reminiscent of the financial crisis:

- The first local peak can be associated with the U.S. Senate passing the Dodd-Frank Act and with the deepening of the European debt crisis around May 2010.
- The second local peak occurs around the downgrade of the U.S. credit rating in August 2011.
- The third local peak follows the Federal Open Market Committee raising interest rates in December 2015.

The Impact of Bond Illiquidity on Yield Spreads

The liquidity of the corporate bond market impacts the real economy through its effect on yields, which can distort investment decisions. To measure the cost of illiquidity on corporate bond yields, we run a Fama-MacBeth regression of corporate yield spreads on γ and AMD.[5] We estimate the coefficients for the complete period (December 2007-June 2017) and three subperiods (December 2007-December 2009, January 2010-November 2015 and December 2015-June 2017). Our results are controlled for variables related to credit (such as CDS) and for other proxies for liquidity (such as volume, frequency, and a bond's age and time to maturity).

Our appendix contains tables showing the full results for both the complete period (Table 1) and the subperiods (Table 2), but the findings can be summarized as follows. Looking at the full sample period, the regression with all controls implies that an increase of one standard deviation of the AMD of an issue increases corporate yield spreads 28 basis points. This increase is equivalent to 13 percent of the average yield spread.

The results are even more substantial for *γ*. An increase of one standard deviation in the *γ* of an issue is associated with an increase in the yield spread of 40 basis points, which corresponds to 18 percent of the average yield spread.[6]

We now analyze how the relation between illiquidity and yield spreads have changed over time by looking at the results across the subperiods. As the results with *γ* and AMD are consistent with each other, we focus our discussion on *γ*. We find that illiquidity is most relevant during the last subperiod (December 2015 to June 2017). A one standard deviation increase in bond illiquidity is associated with an increase in the average yield spread of 12 percent in the first subperiod, 11 percent in the second subperiod and 18 percent in the last subperiod.

These results at the individual bond-level contrast with the downward trend in aggregate market-level illiquidity, as seen by the mean and median of illiquidity over time in Figures 1a and 1b. Although illiquidity decreased on the aggregate, our findings indicate that the level of illiquidity of an individual issue becomes more important for its own price. Our results also indicate a connection between the Fed tightening period — December 2015 to June 2017 — and changes in the relation between illiquidity and corporate bond yields.

Conclusion

The 2007-2009 financial crisis generated a strong response from the U.S. government in terms of financial regulations. Such regulations might imply welfare gains from the increase in macroeconomic stability.

However, it is natural to conjecture that they also might imply costs. Identifying these costs is not a trivial task. We show empirical results from our work in progress "Dealer Balance-Sheet Costs and Customer Counterpart Choice" highlighting two recent developments in the U.S. corporate bond market.

The first result is that the U.S. corporate bond market has become more liquid according to traditional liquidity measures. The second result is that the cost of illiquidity — measured by the impact of illiquidity on the yield spread of corporate bonds — has simultaneously increased. Apparently, there are two forces moving in opposing directions in corporate bond markets.

To understand these developments and connect them to the new financial regulations, we must look beyond traditional illiquidity measures and focus on the behavior of market participants. The 2011 paper "The Illiquidity of Corporate Bonds" shows that while traditional illiquidity measures decreased following the financial crisis, the average bid-ask spread charged by dealers actually increased.

Moreover, the paper documents a change in composition showing that customer-to-customer trades became more frequent relative to dealer-to-customer trades. These two findings can be rationalized by the model proposed in our paper, which allows for customer counterpart choice.

When dealers' cost of intermediating trades increases, dealers increase their bid-ask spread. However, investors seek liquidity from other investors, increasing the number of customer-to-customer trades and decreasing the number of dealer-to-customer trades. Customer-to-customer trades are cheaper, but it takes longer to find another customer to trade with than it does to find a dealer.

This result from the model is consistent with the empirical findings in the 2019 paper "Customer Liquidity Provision: Implications for Corporate Bond Transaction Costs," and it implies that the average bid-ask spread in the market — and therefore traditional measures of illiquidity — can decrease when the dealers' cost of intermediating trades increases. The cost of intermediating trades might increase due to new regulations.

To understand why the cost of illiquidity also increases, note that both dealer-to-customer and customer-to-customer trades are fast in very liquid markets. As a result, the increase in bid-ask spread of dealers does not impact the desirability of the underlying bond, because investors can easily find another investor to trade. On the other hand, in illiquid markets, an increase in dealers' bid-ask spread makes the underlying bond undesirable. The result is that, in equilibrium, investors charge a premium to hold the bond, which increases the cost of illiquidity.

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[1] *The Trade Reporting and Compliance Engine (TRACE) is the "FINRA-developed vehicle that facilitates the mandatory reporting of over-the-counter secondary market transactions in eligible fixed income securities." The bond transactions report was implemented in different phases. It started in July 2002 with Phase I for investment grade bonds and with issue size greater than or equal to $1 billion, and it continued later with the requirements expanded in Phase II in 2003. The complete implementation occurred in 2005, with Phase III. The report of corporate bond transactions is mandatory for all broker-dealer FINRA members. Therefore, Phase III contains virtually complete coverage of all public transactions. For consistency of the selection into the dataset, our dataset focuses on Phase III. The Enhanced TRACE differs from the standard TRACE*

in that it discloses more detailed information in individual transactions, such as actual trade size.

[2] *To remove any potentially erroneous trades still in the database, we subsequently drop trades missing yield information and trades that are either on a when-issued basis, in a non-secondary market, with a special condition, automatic give-ups or in equity-linked notes. We also add a price filter for trades with prices deviating more than 25 percent from the daily average.*

[3] *Bonds must also have sufficient trades to satisfy the conditions necessary to calculate their individual illiquidity measures.*

[4] *While we use a different order based on data availability, this process is similar to the one found in the 2012 paper "Corporate Bond Liquidity Before and After the Onset of the Subprime Crisis."*

[5] *In the first step, we estimate N cross-sectional regressions for each month, where N is the number of issues. In the second step, we average the coefficients over the T periods in the sample. The t-statistics are calculated with standard errors corrected for serial correlation as seen in the 1987 paper "A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix." Our sample implies 115 monthly cross-sections from a sample of 3,073 bonds and 139,168 bond-month observations, as stated in section 2.*

[6] *We consider the one standard deviation change to be the time series average of cross-sectional standard deviations within each interval. Similarly, we consider the average yield spread to be the time series mean of cross-sectional averages within that period.*

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