Secondary Market Trading and the Cost of New Debt Issuance

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ABSTRACT

We show that secondary market activity impacts the cost of issuing new debt in the primary market. Specifically, firms with existing illiquid debt have higher costs when issuing new debt. We also find that with the improvement in the price discovery process brought about by introduction of TRACE reporting, firms that became TRACE listed subsequently had a lower cost of debt. The results indicate that the secondary market functions of liquidity and price discovery are important to the primary market. The results offer important implications for regulators and managers who are in a position to impact secondary market liquidity and price discovery. The results are also important for understanding the connection between the secondary market and the real economy.

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Understanding how financial market activity impacts the real economy is one of the most important topics studied by financial economists. Since firms only raise capital in the primary market it is easy to conclude that trading in the secondary market does not directly affect firm activity. This potential disconnect leads some to view secondary markets as merely a sideshow to the real economy, an idea that has been debated in the academic literature since at least Bosworth (1975). Recent events have revived and added new dimensions to this debate.[1] The discussion that is now taking place in both the academic literature and the popular press indicates that that this question remains both prevalent and ever changing.

To contribute to this debate, we consider whether two important benefits of secondary markets, liquidity and price discovery, impact the primary market. In this paper we empirically investigate two questions: 1. do firms with illiquid bonds face higher costs when issuing new debt, and 2. does price discovery in the secondary bond market impact a firm's cost of issuing new debt? By answering these two questions we seek to address the broader question: how does secondary market activity impact the real economy?

The view that secondary markets impact the real economy begins with the argument that access to capital is an important determinant of growth. The results in the literature consistently indicate that this relation holds at the country, industry, and firm levels. This question has been examined in numerous studies, including the seminal paper by Rajan and Zingales (1996). The literature has evolved to the point where we now also better understand the channels that connect growth and access to capital. The empirical evidence, for example, indicates that access to financing is important for firm investment (Stein (2003); Chava and Roberts (2008); Campello and Graham (2013)). Surveys of corporate decision makers also support this view. For example, after surveying 1,050 Chief Financial Officers (CFOs) Campello, Graham,

[1] Some examples include the bailouts taking place during the financial crisis and the resulting "Main Street" versus "Wall Street" debate arising from the Occupy Wall Street protests (Kuziemko, Norton, Saez, and Stantcheva (2015)), questions as to the relation between economic growth and equity returns (Ritter (2005); Ritter (2012)), and questions related to the controversial practice of using corporate repurchases to prop up firm growth (Driebusch and Eisen, "Buybacks Pump Up Stock Rally," *The Wall Street Journal*, 7/13/2016, Section C1).

and Harvey (2010) report that firms that face financial constraints reduce their investment in both technology and fixed capital and also reduce employment.

Based on the theoretical and empirical evidence in the literature, we therefore take as our starting point that access to capital impacts the real activity of a firm. From this we argue that frictions that impact firm access to capital may impact the real economy. The two channels that we focus on are secondary market liquidity and price discovery. If, for example, an increase in secondary market illiquidity raises a firm's cost of capital or prevents a firm from accessing capital all together, then we can conclude that secondary market illiquidity could hamper a firm's growth.

As Maureen O'Hara discusses in her Presidential Address (O'Hara (2003)), liquidity and price discovery are two of the most important functions of a market. The precise roles that liquidity and price discovery play are still being explored in the literature, with many papers logically focusing on whether secondary market liquidity and price discovery impact trading in the secondary market. For example, when framing the question, O'Hara (2003) focuses on the importance of liquidity and price discovery for asset pricing. These questions are clearly important to the literature, and would likely be important regardless of whether there is a connection between the primary and secondary markets. But if frictions that arise in the secondary market impact the primary markets as well, then questions of liquidity and price discovery take on an additional level of importance. As Morck, Shleifer, and Vishny (1990) argue, if the secondary market is in fact a sideshow, then any inefficiencies that arise in the secondary market represent wealth transfers amongst secondary market participants. While we by no means intend to trivialize the understanding of what could be "wealth transfers" and believe that understanding the trading process is important for its own sake, it is also important to note that connecting this process to the primary market changes the scope of inquiry.

We thus look to examine whether liquidity and price discovery in the corporate bond market impact the primary market for new debt issues. While liquidity and price discovery are important elements of all markets, as Green, Li, and Schürhoff (2010) argue, they are especially important in less liquid markets.

Despite the importance of the topic of price discovery, much of the early focus in the literature has been on the equity market. Recently the number of papers examining price discovery in the bond market has grown, particularly since the introduction of the Trade Reporting and Compliance Engine (TRACE) database. Examples of papers that have examined the price discovery process in the corporate bond markets are: Hotchkiss and Ronen (2002), Bessembinder, Maxwell, and Venkataraman (2006), Ronen and Zhou (2013), and Das, Kalimipalli, and Nayak (2014).

One reason that questions related to price discovery are important is that they speak to questions of market efficiency; market efficiency also impacts the connection between primary and secondary markets. Price discovery is the process by which buyers and sellers come to an agreement over the price of an asset. Market efficiency speaks to whether this "discovered" price reflects certain information. Understanding the price formation process is therefore vital to the understanding of market efficiency; the process dictates the outcome. This argument closely relates to one proposed by Dow and Gorton (1997). In their theoretical paper the authors discuss how a price could meet the criteria of strong form efficiency and yet managers may still make suboptimal investment decisions. This finding leads the authors to conclude that secondary market efficiency is not a sufficient condition for economic efficiency. Thus a better understanding of whether the price discovery process impacts the real activity of a firm is an important empirical question.

Questions related to illiquidity are of no less importance to the literature. In the corporate bond market, for example, Chen, Lesmond, and Wei (2007), Bao, Pan, and Wang (2011), Friewald, Jankowitsch, and Subrahmanyam (2012), and Dick-Nielsen, Feldhütter, and Lando (2012) show that illiquidity is positivity related to the cross-section of bond returns. As the evidence in the literature indicates that liquidity impacts expected returns, there is an implied argument that secondary market liquidity impacts a firm's cost of raising new capital (Amihud and Mendelson (1986)). Fundamental to this argument is the view that expected equity returns and bond yields are proxies for a firm's cost of capital. While this view implies that secondary

market illiquidity and the cost of raising new capital are linked, we look to test this conjecture directly.

We argue that a direct test of this relation is warranted based on the following four points. First, there is a debate in the literature that raises questions as to whether ex post returns are a precise proxy for a firm's cost of capital. As Chen, Chen, and Wei (2011) discuss, ex post returns may reflect other information than a firm's cost of capital, such as grown opportunities and changes in investors' risk preferences (Stulz (1999); Hail and Leuz (2009)), and are also susceptible to questions with respect to the selection of asset pricing model (Fama and French (1997)).

Second, a direct examination of this relation is also important due to the time varying nature of illiquidity. As many papers have shown (please see, for example, Amihud (2002)), both individual security illiquidity and aggregate illiquidity change over time. Furthermore, both managers and regulators have the ability to institute changes that directly impact market liquidity. Managers, for example, have the ability to alter secondary market liquidity and price discovery by changing the information environment (disclosure) and changing their exchange listing. The results of this paper also offer important implications for changes in regulation. If channels exist that connect the real economy to the secondary market then regulations intended to improve secondary market transparency have implications for the real economy.

Third, there is some evidence that greater liquidity can actually be detrimental to the real activities of a firm. Fang, Tian, and Tice (2014), for example, find that greater liquidity can actually impede firm innovation, and attribute the relation to an increase in liquidity leading to an increase chance of a hostile takeover and a decrease in monitoring by institutional investors. Given the question raised by Fang, et al. (2014), understanding precisely how secondary market liquidity impacts a firm's cost of debt is important.

Fourth, in directly examining the relation between secondary market illiquidity and the cost of issuing new debt we are also able to examine whether certain characteristics, such as the firm's credit rating, impact this relation, whether

the relation changes over time, and, in particular, whether the liquidity changes that occurred in the secondary market during the financial crisis are correlated with changes in the issuance process. While there is evidence in the literature that both secondary market liquidity and the availability of credit dried up during the financial crisis, we look to connect these two concepts to better understand the channels. To put this question another way, we ask: were firms with relatively more liquid bonds disproportionally able to continue to access the debt markets during the financial crisis? If secondary market liquidity impacts access to capital then a regulatory objective designed to improve market liquidity will impact a firm's ability to raise new funds. Understanding this channel is generally important, but may be particularly relevant during a liquidity crisis.

One contribution of our paper, therefore, is that it speaks to the question raised by Luigi Zingales in his AFA Presidential Address (Zingales (2015)): Does Finance Benefit Society? As Zingales states (p. 1337): "To this day, empirical measures of the benefits of an efficient market are fairly elusive." By directly examining the link between two defining features of the secondary market and the real economy we seek to identify and quantify just such a benefit.

In this regard, we seek to contribute to the growing literature that explores connections between secondary market trading and the real economy. As this question is important to the academic literature, examining this question takes many forms. Aslan and Kumar (2016) show, for example, that hedge fund activism in a given firm can impact rival firms' product market performance. Grullon, Michenaud, and Weston (2015) show that short selling constraints impact a firm's ability to access capital and thus impact infirm investment. Campello, Ribas, and Wang (2014) show, using the conversion of non-tradable to tradable stocks in China, how secondary market trading can directly impact corporate activity. And, as McLean and Zhao (2014) discuss, the recent financial crisis not only emphasizes the importance of understanding the connection between financial markets and the real economy, but also provides a laboratory for assessing the extent of the connection. While all of these papers examine different channels, the important underlying commonality is

that they all contribute to a better understanding of connections between primary and secondary market activity.

To examine the impact that secondary market illiquidity and price discovery have on the primary market we use the laboratory of publicly traded debt. There are four advantages to using publicly traded debt to examine these relations. First, while firms have the ability to reenter the equity market by using SEOs, this activity is comparatively limited. On the other hand, firms may enter the bond market with greater frequency. Firms frequently have multiple bond issues outstanding and may offer new bonds before the existing bonds mature. Multiple bonds of the same firm are therefore simultaneously traded in the secondary market. This issuance structure allows us to measure the expected illiquidity of a new issue before it begins trading using the current bond illiquidity of a firm's other traded bonds as a proxy for the anticipated bond illiquidity. We can thus examine the relation between the actual cost of debt and the expected market liquidity rather than the relation between the expected cost of capital and the actual market liquidity.

Second, the staggered implementation of the Trade Reporting and Compliance Engine (TRACE) and the subsequent release of all bond trading data through the Enhanced TRACE files provides us with a unique laboratory for testing the impact that secondary market price discovery has on the primary market. As TRACE now provides two data files, one containing information that was disseminated at the time and one that backfills additional data, we are able to examine the impact of trading when prices are not disseminated to the public – an important component of price discovery.

Third, the data on bond issuance and trading has reached the point that we can calculate both the secondary market bond illiquidity as well as the cost of debt issuance. As TRACE was implemented in 2002 we now have a sufficient time series available to conduct empirical tests. The available data also makes calculating the cost of debt issuance relatively straightforward, and allows us to circumvent many of the objections raised in the literature relating to the estimation of a firm's cost of capital (Fama and French (1997)).

Fourth, the degree of heterogeneity amongst bonds provides for an interesting laboratory. With varying maturities, coupon structures, and credit risk, investors have the opportunity to select securities that fit their specific needs. The finite nature of debt forces firms to reenter the market, and each time they do so, they must consider the characteristics of the bond contracts. The cross-sectional differences in bond risks and characteristics in turn, produce cross-sectional variation in bond liquidity.[2]

It is for these four reasons that we believe that publicly traded debt offers us a unique laboratory for testing the relation between secondary market trading and activity in the real economy. Our findings are as follows. We first document a direct relation between the secondary market illiquidity of existing bonds and the cost of new debt issued by the same firm in the primary market. Our results not only suggest that prior illiquidity leads to higher underwriting costs, but that greater illiquidity is also a significant predictor of a firm's ability to issue new debt during a liquidity crisis. We then also find that TRACE-reported bonds experience lower underwriting costs relative to bonds that were not immediately subject to TRACE-reporting requirements. Because the staggered implementation of TRACE provides us a way to capture price discovery, we conclude that a more efficient price discovery process also leads to lower costs in the primary market for new debt issuances.

Overall, the evidence that we present in this paper supports the theory that secondary market activity has the ability to positively impact the real economy. Efforts to improve price discovery and liquidity, such as changes in disclosure and the implementation of TRACE serve not only to improve the secondary market trading environment, but also to provide firms with better access to capital. Better access to capital, in turn, provides firms with better investment options and could potentially improve employment prospects.

[2] Chen, et al. (2007), Bao, et al. (2011), Friewald, et al. (2012), and Dick-Nielsen, et al. (2012) each not only examine the relation between expected returns and bond illiquidity, but also consider the characteristics that impact this relation.

I. Overview of New Corporate Bonds Issuances

A. *The underwriting process*

We begin our paper by describing the underwriting process and primary market for new debt issuances. The process by which firms issue debt motivates our examination of the link between secondary market liquidity and the cost of new issues in the primary market.

When a firm decides to raise capital through the issuance of new bonds, it will seek an investment banker to underwrite the new issue and act as a middleman between the firm and investors. The choice of a lead underwriter(s) is critical to the bond's success. An underwriter's ability, experience, reputation, and strength of relationships with investors are all considered in the selection process (Fang (2005)). Potential underwriters will submit an initial prospectus detailing pricing, strategies, and underwriter compensation. Once chosen, a lead underwriter may form an underwriting syndicate to spread the risk of the new issue and improve the likelihood of selling all of the securities. The underwriter(s) typically has a prearranged group of institutional investors interested in the new debt issue.[3] Underwriters must balance the preferences of these institutional clients with a debt structure (i.e. bond maturity, coupon, and price) that meets the needs of the issuing firm. This is typically done by adjusting the bond's yield.

Underwriters facilitate the announcement of a firm's intention to issue new debt, help the issuer prepare disclosure documents and prospectuses, and also accept indications of interest from investors. Unlike new equity issuances, bond issues typically forego the lengthy roadshow and conference call process. As a result, the time between the announcement and when the bond begins to trade varies from a few hours to days.[4] Even though the timeline for the bookmaking process varies, many of the details of the issue are not set until the end of the process. Consequently, issuers maintain some flexibility in issue size as well as which orders to fill. They

[3] Retail investors may also participate in the primary market for corporate bonds.

[4] Some participants complain that this condensed process does not allow enough time to reliably evaluate the issue, its structure, or the issuing firm's financial position.

also decide what portion, if any, of orders to fill. The underwriting process concludes by setting the coupon and initial issue price.

The underwriter not only provides expertise, but may also agree to buy a portion or even the entirety of the bond issue until the securities are resold to the public or broker-dealers. The difference between the underwriter's purchase price and the price at which the bonds are sold to investors is known as the underwriting spread or underwriting discount. While the initial bond price may be set at par, or at a premium or discount to par value, the pricing structure, itself, does not affect the underwriter's compensation. The underwriter's compensation is based on the discount it pays relative to the markup on the initial issuance.

The underwriting spread may partially depend on a variety of factors including the size and type (public or private) of the issue, as well as demand for the new issue at the initial offering price.[5] Our findings in this paper indicate that underwriters also incorporate secondary market illiquidity of existing bonds when pricing new issues by the same firm. If it is difficult to liquidate a debt position in the secondary markets, both investors and underwriters may demand a higher premium to compensate for the potential liquidity risk associated with the issue in the primary market. In this scenario, underwriter fees, and thus the issuing firm's cost of capital, will increase.

< Table V >

B. Underwriting statistics in our sample

Providing context to the primary bond market described above, we include descriptive data that highlights the frequency and magnitude of new corporate debt issues. As reported in Table I, 1,231 firms issued over $4.95 trillion in debt during the period from January 2002 to December 2012. Many of these firms frequently

[5] The firm must also choose whether to issue bonds in the public or private market. Public issues will not only appeal to a larger group of investors, but may also help firms gain visibility in the marketplace. A firm that obtains financing through private placements will avoid some of the costs associated with a public offering, including the costs of registering the securities with the SEC and complying with GAAP. Private placements are typically less conventional, marketed to a smaller group of investors, and are inherently riskier.

revisited the debt market and issue new bonds. Our sample of 1,231 firms initiated 21,247 new debt placements during the sample period, an average of over 17 issues per firm. These subsequent debt issuances by firms with outstanding debt allows us to measure the costs of new debt as a function of prior illiquidity. From Figure 1, the average firm raises approximately $200 million with each new debt issue.

In Figure 2, we document the aggregate amount of outstanding debt during the sample period. There was approximately $1.80 trillion in total corporate debt outstanding in 2002, of which $1.15 trillion stemmed from unrated corporate bond issues, $560 billion from investment grade debt and $92 billion from speculative grade bonds. By the end of our sample period, in 2012, the amount of outstanding corporate debt ballooned to $3.54 trillion, comprised of $2.06 trillion in investment grade bonds, $1.50 trillion in unrated debt, and $354 billion in speculative grade bonds.

Figure 3 highlights the number and volume of new issues during the period from 2002 through 2012. Although time series fluctuations are evident, new issues are increasing over time. Even during the financial crisis, firms were able to raise capital through the issuance of investment grade debt. However, the number of unrated bonds decreased, and speculative grade issues were almost nonexistent during this time period. From the figures described above, it is apparent that the size and scale of the bond market continues to grow. We believe these results highlight the importance of our empirical analysis as well as the implications of our study for managers, investors, and regulators.

II. Data and Sample

The primary data in our analysis comes from the Mergent FISD database, which includes information for all debt issuances. The FISD database includes the issue size, initial yield, coupon rate, credit rating at issuance, difference between the yield and the treasury rate at issuance, underwriting fees paid, as well as many other characteristics of newly issued corporate bonds. For our analysis of the link between the secondary market illiquidity and the cost of issuing new debt in the primary

market, we augment the Mergent database with bond trading data from the Trade Reporting and Compliance Engine (TRACE) database. The final merged database contains information on all new corporate bond issues, including underwriting costs, coupons, and credit ratings, as well as information on subsequent trading that occurs after the bond is issued. The data allows us to determine the costs and characteristics of new issues in the primary market, as well as to calculate secondary market illiquidity measures once the bonds begin trading. In addition to examining the characteristics of new issues, we also account for the features of a firm's previously issued bonds.

Corresponding with TRACE coverage, our sample contains all new corporate bond issuances from July 2002 through December 2012. We present descriptive statistics of the sample in Table I and Table II. As reported in Table I, the sample contains 21,247 new bond issues, of which 10,687 are investment grade, 1,299 are speculative grade, and 9,261 are unrated. As seen in Table II, the average and median coupon rates are 4.48% and 4.89% respectively. The average (median) years to maturity is 9.89 (7.05) years. Last, 34% of the bonds in the sample are callable, and 1% of the bonds are convertible.

The primary research question we address in this study is whether the secondary market illiquidity of existing bonds is priced into new issues by the same firm. Our analysis of illiquidity presumes that if existing debt for a corporation is illiquid in the secondary market, then subsequent debt issues will incur higher costs. We thus use the illiquidity of a firm's existing bonds as a proxy for the future expected illiquidity of a new issue. This approach allows us to calculate expected illiquidity measures prior to a bond's initial trading.

A. Illiquidity Variables

For our analysis, we compute five measures of secondary market illiquidity. The first measure, $PNT_{i,t}$, is the percentage of days in month t that security i does not trade. It is calculated as

$$PNT_{i,t} = \frac{Zero\ Volume\ Trading\ Days_{i,t}}{Trading\ Days\ in\ Month\ t} \times 100\%.$$

$PNT_{i,t}$ measures an investors ability to trade at all, which is especially relevant in the highly illiquid bond market. Higher values of $PNT_{i,t}$ imply greater bond illiquidity.

The second measure of bond illiquidity is the Kyle and Obizhaeva (KO) measure of price impact. This metric is constructed from the illiquidity measure presented in Kyle and Obizhaeva's (2011) model of market microstructure invariance. The measure is calculated using the variance of monthly bond returns, scaled by the dollar volume traded within the month. Dollar volume is calculated as the final trade price of each day multiplied by daily volume, then summed to calculate the monthly dollar volume. We compute the return variance using all TRACE reported transactions.

$$Kyle\ Obizhaeva\ Illiquidity_{i,t} = \left(\frac{Return\ Variance_{i,t}}{Price_{i,t} * Volume_{i,t}}\right)^{\frac{1}{3}} \cdot 10^6.$$

Because a large return variance for smaller dollar volumes indicates greater illiquidity, larger values of the KO measure specify greater bond illiquidity.

The third measure of bond illiquidity we employ is the Amihud (2002) price impact illiquidity measure, given by:

$$Amihud\ Illiquidity = \frac{1}{D_{i,t}} \sum_{n=1}^{D_{i,t}} \frac{\left|Ret_{i,t,n}\right|}{Price_{i,t,n} * Volume_{i,t,n}} \cdot 10^6\,,$$

where $D_{i,t}$ is the number of observations for security i in month t. TRACE reported transactions are used to identify the return, price, and volume for each bond. Similar to the KO measure above, the intuition behind the Amihud ratio is that larger returns per dollar of trading volume provides an indication of greater bond illiquidity.

As discussed in Bao, Pan, and Wang (2011), a security's price consists of two components. The first is the fundamental value of the security, whereas the second is the transitory illiquidity component. While fundamental value follows a random walk, the transitory illiquidity component is independent from a security's fundamental value. We capture the transitory price movements caused by illiquidity using covariance for security i in month t, defined as

$$\varphi_{i,t} = -Cov(\Delta p_t, \Delta p_{t+1}),$$

where $\Delta p_t = p_t - p_{t-1}$. Greater covariance captures greater illiquidity. This metric is built from Roll (1984) and is used by Bao, Pan, and Wang to capture bond illiquidity.

The last measure of bond illiquidity, $AdjTurnover_{i,t}$, is from Liu (2006). This measure is similar in construction to one proposed by Lesmond, Ogden, and Trzcinka (1999). We compute adjusted turnover for security i in month t as follows:

$$AdjTurnover_{i,t} = \#\ Zero\ Volume\ Trading\ Days_{i,t} + \frac{1/turnover_{i,t}}{Deflator} \times \frac{21}{\#\ Trading\ Days},$$

where zero volume days counts the number of trading days on which the bond did not trade, $turnover_{i,t}$ is the quotient of the total number of bonds traded per month and the total number of outstanding bonds. Following Liu (2006), we use a deflator of 480,000 that allows $0 < \frac{1/turnover_{i,t}}{Deflator} < 1$. Last, we standardize the number of trading days from one month to the next using $\frac{21}{\#\ Trading\ Days}$. The $AdjTurnover_{i,t}$ illiquidity metric is similar to $PNT_{i,t}$, but distinguishes between two bonds with similar zero volume trading days. This measure is increasing in illiquidity.

In Panel A of Table III, we present summary statistics for the five illiquidity measures. The average bond in our sample trades on 5.40 days per month. The average bond trades 148 times throughout the month, which generates over $283 million in volume. When partitioned according to credit rating, speculative grade bonds trade more frequently than investment grade bonds as well as bonds that are not rated. Because there is a great deal of skewness among the cross section of bonds in our sample, we winsorize the illiquidity measures described above, and typically report regression results after taking the natural log.

B. Cost of New Debt Variables

We use three measures to identify the costs associated with issuing new bonds. Similar to Butler (2008), we use the yield to maturity and the gross underwriting spread as our two principal measures of underwriting cost. When a corporation issues new debt, the immediate cost that the corporation bares is the yield that is required by investors, as well as the gross spread which is paid to the underwriter.

Since our sample runs through the financial crisis, the yield on corporate bonds may vary, and as such, we include the treasury spread, the difference between the yield to maturity and the treasury yield at the time of issuance. When controlling for credit risks, the treasury spread may be a more stable measure of cost than the yield at issuance. While the treasury yield spread will be small on safer bonds issued by large firms, investors typically demand higher returns on smaller, riskier bonds, which results in a higher treasury spread. As such, we employ the Treasury spread as an additional measure of the cost of a new issue.

We present summary statistics for the above cost measures in Panel B of Table III. As expected, investment grade bonds have lower yields and smaller underwriting spreads than those of speculative grade bonds. During our sample period, new issue bonds have an average yield of 4.89%, and pay a gross spread of 11.94%. Management fees are also higher for more speculative bond issues.

III. The Economic Effects of Secondary Market Liquidity in the Primary Market

A. Main tests of secondary market illiquidity and the cost of new debt issues

The primary conjecture we offer in this paper is that two principal functions of the secondary market, liquidity and price discovery, each have a direct impact on the cost of issuing new debt in the primary market. Similar to that presented in Mauer and Senbet (1992) and Ellul and Pagano (2006), we argue that liquidity in the secondary markets for debt instruments may impact pricing in the primary market. We also expect that if there is a liquidity discount for equities as observed in Butler, Grullon, and Weston (2005) and Fang, Noe, and Tice (2009), then there could be a similar liquidity discount for debt instruments. In order to study the real effects offered through each channel, we first identify corporate bonds issued between 2002 and 2012. We link each newly issued bond with existing bonds issued by the same firm. Since we are concerned whether secondary market illiquidity affects the cost of new issues, we require firms to have outstanding bonds issued after 1975. From this

set of prior issues, we eliminate those that mature more than three years prior to the new issues since bond characteristics may change over time; a matured bond's characteristics may not reflect the market's perception of a new issue occurring three years after it matures. We also exclude prior issues that originated within the previous month, since there is not sufficient data to measure illiquidity.

For each previously issued bond, we calculate the five illiquidity measures of existing debt (described in Section II) during each month of the sample period. To aid our understanding of how prior illiquidity impacts the cost of new debt, we average the monthly illiquidity variables from all prior issues over the previous year. Should a firm have multiple prior issues, we weight the illiquidity from the prior year according to issue size before averaging. Additionally, to address concerns that investors may place more emphasis on recent issues (since these bond characteristics may be similar to the current issue), we also perform all of our analyses using only prior issues that originated within five years of the current issue. The results presented in this paper are robust to these alternative specifications.

In our first empirical test, we consider the full sample of public and private corporate debt issues from 2002-2012. To determine if prior illiquidity impacts future underwriting costs, we regress our cost measures (initial YTM, the Treasury Yield Spread, and Gross Underwriting Spread) on each of the five illiquidity measures. To isolate the effects of prior illiquidity on the underwriting costs of new issues, we control for the new issues' time to maturity, issue size, and credit rating. Additionally, we account for the issue size of the previously issued bonds. We also include coupon rate in regressions of Gross Underwriting Spread. All regressions include firm-year fixed effects as well as controls for credit rating and whether the bond is callable or convertible. Last, we interact the credit rating of the new bond with the specific illiquidity measures from previous issues.

The coefficient estimates for our cross-sectional regression tests are reported in Table IV. In Panel A, when considering Initial Yield to Maturity (YTM) as the dependent variable, we find a positive relation between the illiquidity of previously issued debt and the cost of new issues by the same firm. Given that the initial YTM

captures the yield required by investors, a positive and significant coefficient on both (KO and Amihud illiquidity) price impact measures indicates that firms incur higher costs on new issues if their previously issued bonds are illiquid. Specifically, these metrics capture the price impact of trading outstanding bonds in the secondary market. As such, we believe that difficulties in placing large orders for existing bonds leads to higher yields demanded by investors in the primary market. The coefficients of *Years to Maturity* and *Issue Size* are positive as well, suggesting that investors require a larger yield for longer maturity bonds as well as for larger debt issuances. Because new debt offerings affect a firm's capital structure, larger bond issues increase the default risk of the issuer. Similarly, investors also require higher yields from firms with more prior issues outstanding, as seen in the positive coefficient of *Number of Prior Issues*.

The results when considering the Treasury Yield Spread as the dependent variable, as reported in Panel B, are similar. We, again, find that greater illiquidity leads to higher costs, in this case higher yield spreads, in the primary market. Because larger yield spreads typically indicate greater risk associated with a new issue, the positive coefficients on four of our five illiquidity measures specify that secondary market illiquidity of existing bonds likely captures the potential illiquidity risk of new issues. Additionally, as seen in the sign of the interaction term, *Speculative*Illiquidity,* speculative bonds incur higher costs in the primary market than investment grade bonds. Because the treasury yield spread may be a more accurate measure of cost than the yield at issuance, we conclude that investors view new debt offered by firms with more illiquid outstanding bonds as risky, and thus demand higher yields in return.

Last, we regress Gross Underwriting Spreads on the same variables as above and report the coefficients in Panel C. We find a direct relation between the illiquidity of existing bonds and the costs incurred in the underwriting process. A positive and significant coefficient on *PNT* indicates that firms incur higher costs on new issues if their previously issued bonds trade on fewer days of the month. The coefficient on *PNT* is not only positive, but is larger than the coefficient of other illiquidity variables

presented in Table IV. Because *PNT* is, perhaps, the most intuitive illiquidity metric used in our study, we conclude that the magnitude of the coefficient on *PNT* leaves little doubt as to whether traders price secondary market illiquidity into the cost of new debt issues.

We find that *Issue Size* is negatively related to the Gross Underwriting Spread. The sign of this coefficient is in sharp contrast to the same variable presented in regressions of initial YTM and Treasury spreads. However, because investment banks collect a portion of the total debt issued as compensation, underwriters may be more willing to offer a quantity discount for larger issues. In total, the results in Table IV offer compelling evidence that secondary market illiquidity leads to higher underwriting costs for new issues.

<Table IV>

As discussed in Yasuda (2005), underwriters consider first-time issuances more difficult to market, relative to bonds offered by seasoned and frequent issuers. Because firm-time issuers have no track record, their new placements exhibit high "informational sensitivity," and consequently, may be charged a premium by underwriters. We consider a subsample of reissues by "first-time" debt issuers. By removing seasoned firms with greater debt exposure, and instead study the second debt offering of these first-time issuers, we believe we are able to more appropriately examine the effects of prior illiquidity on the costs of a new issue. The initial bonds issued by different firms will have varying degrees of secondary market illiquidity. Thus, if both underwriters and investors have a limited information set regarding the first-time issuer, we expect the illiquidity premium to be even more pronounced for firms with more illiquid debt.

As reported in Panel A of Table V, we find 948 firms that issue debt for the first-time between 2002 and 2012. We examine the relation between the secondary market illiquidity of the initial issue and the costs associated in 597 second issues by the same firm. As reported in Panel B, these firms, on average, return to the debt market 1.83 years later, and typically raise more money in the second issue relative to the first.

< Table V >

We report the results of our multivariate analysis in Table VI. Our approach in this portion of our investigation is similar to that presented in Table IV. However, in Table VI, we consider only the costs of a firm's second debt issue, and not the costs associated with any other subsequent issues. In addition to years to maturity and the size of the issue, we include controls for whether the bonds are rated, as well as the time between the debt issuances. Given that debt offerings by first-time issuers are more challenging to underwrite than subsequent offerings by frequent and seasoned issuers, including these control variables allows us to isolate the illiquidity effects on the costs of a subsequent issue.

Our results in Table VI are similar to those presented in Table IV. In our test of first time issuers, we find that the cost of new debt is higher for second issues when a firm's initial issue has greater secondary market illiquidity. First, when considering the initial yield to maturity in Panel A, we find that each illiquidity measures (except *Amihud*) is priced into the cost of new issues by the same firm. Similarly, in Panel B, we find that both price impact measures, as well as the adjusted turnover metric are positively related to the treasury spread. The results pertaining to gross underwriting spreads indicate that underwriters also account for expected secondary market illiquidity when determining their compensation structure, as seen in the positive coefficient on *PNT* as well as on the covariance illiquidity measure. In total, the results in Table VI suggest that both investors and underwriters demand higher premiums to compensate for the potential liquidity risk associated with new debt offerings.

< Table VI >

B. Secondary market illiquidity and access to debt

The prior results show that illiquidity can alter a firm's cost of debt, suggesting that secondary market illiquidity impacts a firm's borrowing cost, which in turn, impacts a firm's access to capital. This set of results indicates that firms pay a premium for issuing new debt when their previously issued debt is comparatively

illiquid. These tests, however, are predicated on firms being able to access credit markets in the first place. In our next set of tests, we further explore this relation by asking: does secondary market illiquidity predict new credit issuance?

If illiquidity raises a firm's cost of debt, as our prior results indicate, then on the margin this relation will impact the set of profitable projects available to a firm. Firms with a higher cost of debt may therefore forgo projects that they may have otherwise undertaken. Note too that difficulties in raising new capital may be driven by both firm specific factors as well as market events. Thus firms may experience changes in their access to capital when either firm-level illiquidity changes or market-level illiquidity changes. Understanding how aggregate market conditions and macroeconomic factors impact a firm's access to capital is also an important question (Erel, Julio, Kim, and Weisbach (2012)).

We begin our analysis by finding the total number of firms that could potentially be repeat issuers. A simple, necessary condition for being a repeat issuer is that a firm must already have existing debt that is traded the secondary market. We then observe how many firms actually issue new debt each year. In Table VII we present the descriptive statistics of firms that issue debt as well as those that do not issue debt during the same period. We partition the sample into subsets based on credit rating.

< Table VII >

To determine if prior illiquidity poses a hurdle that firms must overcome when issuing new debt securities, we report the results of cross-sectional probit tests in Table VIII. The dependent variable is an indicator variable equal to one if a firm issues debt in the current year (year t). The independent variable of interest is the average monthly illiquidity measures for the same firm in year t-1. We include the log of the dollar value of the current debt outstanding to control for a firm's need for new debt. Given that the financial crisis was a market-wide shock, we also include an indicator variable for the years 2008 and 2009, as well as an interaction between illiquidity and the recession years. As a final control, we include indicator variables for the median credit rating of the same firm's bonds in the year prior.

As seen in Panel A, the negative and significant coefficients on the majority of the illiquidity measures indicate that firms with greater illiquidity in their existing bonds are less likely to issue new debt. These results indicate that illiquidity represents an impediment to accessing credit. Firms with comparatively illiquid debt will thus find it more difficult fund or expand operations.

The results in Tables IV, V, and VI suggest that firms with illiquid bonds experience higher costs of new issues. The results in Table VIII indicate that illiquidity also serves as a predictor of a firm's ability to access credit markets entirely. Our results offer practical implications for managers as they indicate that secondary market trading provides real economic benefits. Collectively, our results indicate that illiquidity improvements are not only associated with the potential lowering of a firm's cost of debt, but also indicate that illiquidity improvements might change the ability of a firm to access debt altogether.

< Table VIII >

IV. The Economic Effects of Secondary Market Price Discovery in the Primary Market

In the previous section, we provide evidence that prior illiquidity of existing bonds has a significant economic impact on the underwriting costs incurred by issuing firms. As previously discussed, however, liquidity is only one major function provided by secondary markets. Another important role of secondary markets is to provide the opportunity for price discovery, the process by which new information is incorporated into prices. In this section, we explore whether the price discovery process that occurs in the secondary market also has an economic impact on underwriting costs incurred by firms in the primary market.

One difficulty in determining the effects of liquidity and price discovery is that the two are often indistinguishable in empirical tests. An improvement in one typically produces an improvement in the other. The corporate bond market allows us a novel approach to disentangle the two effects. As mentioned earlier, the staggered implementation of the Trade Reporting and Compliance Engine (TRACE)

and the subsequent release of all bond trading data through the Enhanced TRACE files provides us a way to test the impact of secondary market price discovery on the primary market.

The Trade Reporting and Compliance Engine (TRACE) is the vehicle that enables mandatory transaction reporting for corporate bonds. Prior to the implementation of TRACE, investors did not have access to real-time information on transaction sizes and prices. While traders were still able to find liquidity in the pre-TRACE period, investors were forced to transact with an information set that included only stale prices. Consequently, the price discovery process was severely inhibited prior to the implementation of TRACE. Because TRACE allows traders to see prices in real-time, the price discovery process was much more efficient for TRACE-reported bonds than for bonds that were not TRACE reported.

Not all new debt issuances immediately after 2002 were TRACE-reported. As presented in Table IX, only 26% of all new debt issuances were TRACE-reported in 2002. This percentage increases every year until 2006, the year in which all new issues are TRACE-reported and thereby provide real-time transparency to traders.[6] The staggered implementation of TRACE allows us to examine the impact of trading when prices are not disseminated to the public. Specifically, we compare the cost of new bond issues that are TRACE-reported to the costs of new bond issues that were

[6] As reported in the TRACE fact book: During Phase I, effective on July 1, 2002, public transaction information was disseminated immediately upon receipt for the larger and generally higher credit quality issues: (1) Investment-Grade debt securities having an initial issue of $1 billion or greater; and (2) 50 Non-Investment-Grade (High-Yield) securities disseminated under FIPS that were transferred to TRACE. Under these criteria, FINRA disseminated information on approximately 520 securities by the end of 2002. Phase II, fully effective on April 14, 2003, expanded public dissemination to include transactions in smaller Investment-Grade issues: (1) all Investment Grade TRACE-eligible securities of at least $100 million par value (original issue size) or greater rated A3/A- or higher; and (2) a group of 120 Investment-Grade TRACE-eligible securities rated Baa/BBB and 50 Non-Investment-Grade bonds. As Phase II was implemented, the number of disseminated bonds increased to approximately 4,650 bonds. In Phase III, fully effective on February 7, 2005, approximately 99 percent of all public transactions and 95 percent of par value in the TRACE-eligible securities market were disseminated immediately upon receipt by the TRACE System. However, transactions over $1 million in certain infrequently traded Non-Investment-Grade securities were subject to dissemination delays, as were certain transactions immediately following the offering of TRACE-eligible securities rated BBB or below.

not yet subject to TRACE reporting. Greater price discovery in a firm's outstanding bonds should benefit underwriters when pricing new issues.

< Table IX >

To determine if firms with TRACE-reported bonds experience lower costs in the primary market for new issues, we perform a similar analysis to that presented in Table IV and Table VI. This time, we include an indicator variable specifying whether outstanding bonds issued by the same firm are TRACE reported. We include, but do not report, the same control variables presented in previous tables. To disentangle the effects of price discovery from that of liquidity, we also control for each of the five illiquidity metrics used in our analysis to this point. The TRACE-reported indicator variable is the primary variable of interest.

The results in Table X indicate that firms with TRACE-reported bonds experience lower underwriting costs in the primary market than firms who had bonds that were not TRACE reported. Across all five panels of Table X, we find a negative and significant coefficient of the TRACE-reported indicator variable suggesting that bonds with greater transparency and price discovery in the secondary market have lower underwriting costs and yield spreads in the primary market. While numerous studies document an improvement in secondary market liquidity with the implementation of TRACE on July 1, 2002 (see, for example, Bessembinder, et al. (2006) and Goldstein, Hotchkiss, and Sirri (2007)), none of these studies look at the effects of TRACE reporting on the costs of new issues in the primary market. We are the first to show that improved price discovery in the secondary market leads to lower costs of new debt in the primary market.

< Table X >

V. Conclusion

Primary markets, where securities are initially purchased from the issuing firm, serve a clear and necessary purpose. Through the issuance of new securities in the primary market, firms are able raise capital to fund or expand operations. After underwriting fees are subtracted, all proceeds from security issuances go directly to

the issuing firm. Issuing firms do not, however, receive a direct capital inflow from transactions occurring in the secondary market, where investors trade with other investors. While issuing firms are unable to directly collect new investment in the secondary market, firms may still indirectly benefit from trading in the secondary market. Greater secondary market liquidity for equity securities, for example, is shown to lower a firm's cost of capital and lead to significant improvements in firm performance (Butler, et al. (2005); Fang, et al. (2009)). While the economic significance of liquidity has motivated a number of studies on secondary markets, much less is known on the relation between liquidity in the secondary bond market and the cost of new debt issuances in the primary market.

In this paper, we explore whether secondary market liquidity for corporate bonds provides a positive and significant benefit to the issuing firm. Unlike the primary equity markets of IPOs and SEOs, which are accessed infrequently, the sheer volume of bond issues and reissues, along with the scope of firms and entities issuing debt allow us to address a question posed by Zingales (2015) as to whether finance, in this case secondary markets, benefit society.

Our results indicate that the illiquidity of outstanding bonds is priced into new debt issues by the same firm. We also find that greater illiquidity reduces the likelihood that firms return to the debt market during periods of market turmoil. Additionally, our results suggest that a more efficient price discovery process in the secondary market reduces the cost of new issues in the primary market. The practical inference from our results is that secondary markets are not simply a sideshow, but do in fact provide real economic benefit to issuing firms. Our paper contributes to the growing body of research that sheds light on the societal benefits provided by secondary market. We conclude by suggesting that efforts to improve liquidity and price discovery in secondary markets is warranted, not only because they improve secondary market trading, but also because they provide firms better access to capital to fund growth opportunities.

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Table I
Corporate Bond Issues (2002-2012)

This table reports the summary statistics for new issues of corporate bonds during the sample period 2002 through 2012. Panel A reports the statistics for the entire sample period, while Panel B reports the statistics averaged by year. Statistics are partitioned by investment rating at the time of issue. Number of issuers is the number of unique corporations that issue bonds during the sample period, and number of issues is the total number of unique issues from the issuers in the sample. Total volume is the sum of the issue amount, and average issue size is the mean of the amount issued.

	Investment Grade	Speculative Grade	Not Rated	Full Sample
Panel A: Full Sample				
Number of Issuers	440	99	692	1,231
Number of Issues	10,687	1,299	9,261	21,247
Volume Issued (Millions)	2,645,152	343,210	1,966,952	4,955,313
Avg. issue size	247.51	264.21	212.39	233.22
Panel B: Average per year				
Number of Issuers	40.00	9.00	62.91	111.91
Number of Issues	971.55	118.09	841.91	1,931.55
Volume Issued (Millions)	240,468	31,201	178,814	450,483
Avg. issue size	360.56	542.65	292.53	335.91

Table II
Corporate Bond Characteristics at Issuance

In this table, we present the characteristics of newly issued corporate bonds. Major characteristics include the coupon paid to investors, the time in years until the bond matures as a percent of par. Additionally, we include the proportion of new issues that are callable and convertible. We report means and medians. Characteristics of bonds are partitioned according to investment rating at the time of issue.

	Investment Grade	Speculative Grade	Not Rated	All
Mean				
Coupon	4.40	5.54	4.42	4.48
Years to Maturity	9.97	11.28	9.61	9.89
Offer Yield	4.86	5.64	4.83	4.89
Offering Price of Par	99.87	99.86	99.85	99.86
Proportion Callable	0.32	0.42	0.34	0.34
Proportion Convertible	1.00	1.00	1.00	1.00
Median				
Coupon	4.88	5.68	4.75	4.89
Years to Maturity	7.02	9.99	7.54	7.05
Offer Yield	5.00	5.65	5.00	5.03
Offering Price of Par	100.00	100.00	100.00	100.00
Total New Issues (2002-2012)	10,687	1,299	9,261	21,247

Table III
Liquidity and Cost of Newly Issued Corporate Bonds

In this table, we report the main variables used to identify illiquidity and the cost of issuing bonds. In Panel A, we report the average issue illiquidity variables, which include the number of days in a month that a bond is traded, the dollar volume traded in a month, the number of trades in a month, the Kyle-Obizhaeva (2011) illiquidity measure, and the Amihud (2002) liquidity measure. Panel B reports the principal costs to issuing bonds, which includes the yield to maturity at issue, the gross spread paid to the underwriting syndicate, the management fee, the reallowance fee, and the difference between the treasury yield and the bond's yield to maturity at issuance. We report means and medians.

	Investment Grade	Speculative Grade	Not Rated	All
Panel A: Liquidity Descriptive Statistics				
Mean				
Monthly Trading Days	5.35	6.00	5.37	5.40
Monthly $ Volume per issue	266,134,012	667,601,291	249,713,397	283,521,628
Monthly trades per issue	144.44	182.11	147.72	148.17
Kyle-Obizhaeva Liquidity	3.36	3.62	3.35	3.37
Amihud Bond Liquidity	3.27	3.04	3.65	3.45
Median				
Monthly Trading Days	4.00	4.00	4.00	4.00
Monthly $ Volume per issue	3,671,000	6,291,000	4,150,060	4,000,000
Monthly trades per issue	18.00	32.00	23.00	21.00
Kyle-Obizhaeva Liquidity	1.40	1.35	1.73	1.52
Amihud Bond Liquidity	1.06	1.35	1.42	1.24
Panel B: Cost of Issuing Descriptive Statistics				
Mean				
YTM at issuance	4.86	5.64	4.83	4.89
Bond issue gross Spread	11.09	12.76	12.79	11.94
Management Fee	4.96	6.95	7.91	6.64
Reallowance Fee	2.19	2.18	2.47	2.34
Spread to Benchmark	1.72	2.97	2.07	1.94
Median				
YTM at issuance	5.00	5.65	5.00	5.03
Bond issue gross Spread	8.75	10.00	10.00	9.75
Management Fee	4.00	4.00	5.00	4.00
Reallowance Fee	2.50	2.50	2.00	2.00
Spread to Benchmark	1.45	2.63	1.52	1.50
Total New Issues (2002-2012)	10,687	1,299	9,261	21,247

Table IV

The Cost of Issuing Illiquid Bonds

In this table, we report cross-sectional regression tests of the costs of new issues on prior illiquidity of outstanding bonds. The sample included new public and private corporate bond issues of during the ten-year period between 2002 and 2012. To measure secondary market illiquidity, each bond is required to have at least one other debt issuance prior to the current new issue. When computing the liquidity of existing debt, we use the average monthly liquidity of all outstanding bonds for the year prior to the new issue, weighted by issue size. The illiquidity variables include *PNT*, the percentage of of days in a month that a bond does not trade, the Kyle-Obizhaeva (2011) measure of price impact, the Amihud (2002) measure of price impact, the covariance illiquidity measure, and Liu's (2006) adjusted turnover measure. The dependent variable in all specifications is a form of issuing costs, including the yield to maturity at issuance (in Panel A), the difference between the yield to maturity and the treasury yield at issuance (in Panel B), and the gross spread paid to the underwriter (in Panel C). The independent variables include the years to maturity, log of the issue size, log of prior issue size, number of prior issues, as well as interaction terms between illiquidity and the bonds credit rating. Other control variables include indicators for convertible and callable bonds, as well as firm and year fixed effects. All regressions include firm and year fixed effects. Robust test-statistics are reported in parentheses, where ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.

Panel A: Initial YTM	(1)	(2)	(3)	(4)	(5)
Intercept	3.79***	3.86***	4.16***	3.65***	3.72***
	(16.67)	(15.52)	(15.73)	(16.57)	(16.61)
PNT	-0.19***				
	(-3.18)				
Log Kyle-Obizhaeva		0.03***			
		(3.06)			
Log Amihud			0.02***		
			(4.44)		
Log Covariance				-0.01	
				(-0.66)	
Log Adj. Turnover					-0.01
					(-1.56)
Speculative * Illiquidity	0.38**	0.10***	0.02	0.22***	-0.06**
	(2.13)	(2.70)	(1.48)	(3.69)	(-2.23)
Not Rated * Illiquidity	0.30***	-0.02	-0.03***	0.05**	0.04***
	(3.92)	(-1.36)	(-4.36)	(2.21)	(3.12)
Years to Maturity	0.07***	0.07***	0.07***	0.07***	0.07***
	(48.80)	(49.43)	(49.28)	(28.22)	(48.02)
Log Issue Size	0.05***	0.05***	0.05***	0.09***	0.05***
	(8.71)	(8.94)	(8.83)	(6.30)	(9.26)
Log Outstanding Issue Size	0.04	0.05**	0.04*	0.03	0.04
	(1.64)	(2.08)	(1.73)	(0.58)	(1.59)
Number of Prior Issues	0.00***	0.00***	0.00***	0.00***	0.00***
	(3.64)	(3.45)	(3.65)	(3.76)	(4.10)
Callable, Convertible	Yes	Yes	Yes	Yes	Yes
Credit Rating Controls	Yes	Yes	Yes	Yes	Yes
Firm and Year Fixed	Yes	Yes	Yes	Yes	Yes
Adj-R^2	0.50	0.50	0.50	0.48	0.48
n	918	919	917	741	918
Observation	12,974	12,974	12,880	3,883	12,974

Panel B: Treasury Yield Spread	(1)	(2)	(3)	(4)	(5)
Intercept	0.44**	0.99***	1.08***	0.55***	0.43**
	(2.28)	(4.64)	(4.69)	(2.88)	(2.25)
PNT	0.10**				
	(2.08)				
Log Kyle-Obizhaeva		0.04***			
		(4.16)			
Log Amihud			0.02***		
			(3.98)		
Log Covariance				0.02	
				(1.48)	
Log Adj. Turnover					0.01**
					(2.10)
Speculative * Illiquidity	0.21	0.08**	0.04***	0.15***	-0.04*
	(1.32)	(2.20)	(2.63)	(2.87)	(-1.88)
Not Rated * Illiquidity	-0.13**	-0.03**	-0.01*	0.01	-0.00
	(-2.04)	(-2.41)	(-1.94)	(0.28)	(-0.09)
Years to Maturity	0.02***	0.02***	0.02***	0.01***	0.02***
	(14.10)	(13.88)	(13.86)	(4.68)	(13.12)
Log Issue Size	0.08***	0.08***	0.08***	0.12***	0.08***
	(16.52)	(16.68)	(16.48)	(9.40)	(16.43)
Log Outstanding Issue Size	0.01	0.02	0.01	0.04	0.01
	(0.32)	(0.76)	(0.42)	(0.95)	(0.61)
Number of Prior Issues	0.00***	0.00***	0.00***	0.00***	0.00***
	(9.65)	(9.15)	(8.91)	(4.51)	(9.02)
Callable, Convertible	Yes	Yes	Yes	Yes	Yes
Credit Rating Controls	Yes	Yes	Yes	Yes	Yes
Firm and Year Fixed	Yes	Yes	Yes	Yes	Yes
Adj-R^2	0.39	0.40	0.40	0.36	0.36
n	920	919	943	739	920
Observation	11,366	11,366	11,283	3,737	11,366

Panel C: Underwriting Spread	(1)	(2)	(3)	(4)	(5)
Intercept	12.91***	17.01***	15.74***	16.58***	14.41***
	(7.38)	(8.81)	(7.75)	(9.90)	(8.51)
PNT	2.62***				
	(5.70)				
Log Kyle-Obizhaeva		0.13*			
		(1.74)			
Log Amihud			-0.00		
			(-0.07)		
Log Covariance				0.03	
				(0.53)	
Log Adj. Turnover					0.23***
					(3.27)
Speculative * Illiquidity	-0.43	-0.11	-0.14	1.04***	-0.01
	(-0.30)	(-0.35)	(-1.08)	(4.14)	(-0.06)
Not Rated * Illiquidity	-1.40**	0.22*	0.07	0.13	-0.14
	(-2.34)	(1.96)	(1.20)	(1.46)	(-1.40)
Coupon	-0.12***	-0.12***	-0.11***	0.19***	-0.11***
	(-2.76)	(-2.75)	(-2.58)	(3.43)	(-2.61)
Years to Maturity	0.49***	0.49***	0.48***	0.26***	0.49***
	(44.28)	(44.06)	(43.67)	(21.94)	(44.40)
Log Issue Size	-1.13***	-1.15***	-1.16***	-1.44***	-1.15***
	(-29.97)	(-30.61)	(-30.59)	(-26.05)	(-30.41)
Log Outstanding Issue Size	-0.83***	-0.77***	-0.83***	-1.15***	-0.93***
	(-4.56)	(-4.18)	(-4.42)	(-6.17)	(-5.09)
Number of Prior Issues	-0.00	-0.00	-0.00	0.01***	0.00
	(-0.36)	(-0.95)	(-0.81)	(6.98)	(0.43)
Callable, Convertible	Yes	Yes	Yes	Yes	Yes
Credit Rating Controls	Yes	Yes	Yes	Yes	Yes
Firm and Year Fixed	Yes	Yes	Yes	Yes	Yes
Adj-R^2	0.27	0.27	0.27	0.27	0.27
n	945	945	943	765	945
Observation	16,022	16,022	15,912	4,530	15,940

Table V
First time issuers

This table presents summary statistics for first-time bond issuers during the period from 2002 through 2012. This subsample of bond issuers includes firms that potentially have little information regarding the expected risks of the issue. Panel A reports the frequency of first time issuers, including the total number of initial issues, the total number of second issues, as well as the total number of subsequent issues for the remainder of the sample period. In instances where a firm issues two different bonds with differing maturities on the same day, both count as a second issue. Panel B summary statistics of issues by first time issuers.

Panel A: Frequency of new issuers	
First Time Issuers: 2002-2012	948
First time issuers with a Second Issue: 2002-2012	597
Total subsequent issues: 2002-2012	6,331

Panel B: Summary Statistics of Secondary Issues				
	Mean	Median	Min	Max
Total Subsequent issues per issuer	2.18	1.00	1.00	85.00
Size of Initial Issue	508.83	362.50	0.37	5,000.00
Size of Second Issue	536.72	400.00	0.15	4,625.00
Years between Initial and Second issue	1.83	1.24	0.01	10.70

Table VI

Cost of issuing bonds following first time issues

This table presents the cross sectional regression tests of underwriting costs on a firm's second bond issue. To be included in the sample, a firm must be issuing its second bond, where the only other bond issued by the corporation is the initial issue that occurred previously. The dependent variable includes the costs of the second bond issued by a firm, namely the initial yield to maturity, the underwriting spread paid to the syndicate, and the difference between the initial yield to maturity and the treasury yield. The principal independent variable is the average monthly liquidity of the single previously issued bond prior to the current issue. Control variables include an indicator variable identifying whether the bond is speculative grade or not rated, the time in years between initial and second issue, years to maturity of the current issue, the log of the issue size, and year fixed effects. Robust t-statistics are reported in parentheses, with ***,**, and * indicating significance at the 1%, 5%, and 10% levels respectively.

Panel A: Initial YTM	(1)	(2)	(3)	(4)	(5)
	PNT	KO	Amihud	Cov.	Adj. TO
Intercept	0.10	-0.01	0.01	-0.01	0.01
	(1.00)	(-0.57)	(0.86)	(-0.25)	(0.75)
Illiquidity	0.99***	0.81*	0.77	2.52**	0.30***
	(2.82)	(1.76)	(1.53)	(2.24)	(2.96)
Junk Rated	-0.28*	0.41	-0.40	0.52	-0.05
	(-1.91)	(1.52)	(-1.02)	(1.28)	(-0.94)
Not Rated	-0.67**	0.05	0.02	0.19**	-0.06**
	(-2.41)	(1.42)	(1.16)	(1.98)	(-2.25)
Junk*Illiquid	0.27**	0.03	-0.02	0.05	0.04**
	(2.29)	(1.38)	(-1.14)	(1.26)	(2.19)
Unrated*Illiquidity	0.10	-0.01	0.01	-0.01	0.01
	(1.00)	(-0.57)	(0.86)	(-0.25)	(0.75)
Controls	Yes	Yes	Yes	Yes	Yes
Firm & Year	Yes	Yes	Yes	Yes	Yes
Adj-R^2	0.61	0.61	0.61	0.59	0.61
n	383	383	383	333	383
Observations	3,528	3,528	3,454	1,299	3,528
Panel B: Treas. Yield Spread	PNT	KO	Amihud	Cov.	Adj. TO
Intercept	0.30***	0.00	-0.00	0.02	0.01
	(3.15)	(0.33)	(-0.29)	(0.61)	(1.29)
Illiquidity	0.43	2.37***	2.45***	0.63	0.37***
	(1.33)	(3.86)	(3.57)	(0.58)	(3.54)
Junk Rated	0.43***	-0.23	0.08	0.30	0.09*
	(3.22)	(-0.87)	(0.20)	(0.75)	(1.83)
Not Rated	-0.01	0.15***	0.07***	0.04	0.02
	(-0.05)	(3.24)	(3.03)	(0.41)	(0.78)
Junk*Illiquid	-0.28**	-0.02	-0.00	0.01	0.00
	(-2.54)	(-1.25)	(-0.07)	(0.29)	(0.20)
Unrated*Illiquidity	0.30***	0.00	-0.00	0.02	0.01
	(3.15)	(0.33)	(-0.29)	(0.61)	(1.29)
Controls	Yes	Yes	Yes	Yes	Yes
Firm & Year	Yes	Yes	Yes	Yes	Yes
Adj-R^2	0.37	0.37	0.37	0.39	0.37
n	386	386	386	384	386
Observations	3,135	3,135	3,070	1,261	3,135

Panel C: Underwriting Spread	PNT	KO	Amihud	Cov.	Adj. TO
Intercept	2.92***	0.24***	0.11**	0.08	0.13*
	(5.31)	(3.19)	(2.30)	(0.68)	(1.94)
Illiquidity	5.25***	3.35	2.47	15.43***	0.68
	(2.71)	(1.42)	(0.97)	(3.22)	(1.30)
Junk Rated	2.46***	-1.90	-4.29**	0.80	0.36
	(3.15)	(-1.44)	(-2.30)	(0.45)	(1.28)
Not Rated	-3.78**	0.19	0.05	1.11***	-0.06
	(-2.53)	(1.12)	(0.65)	(2.67)	(-0.42)
Junk*Illiquid	-1.59**	-0.18*	-0.16**	0.02	0.05
	(-2.56)	(-1.83)	(-2.56)	(0.15)	(0.50)
Unrated*Illiquidity	2.92***	0.24***	0.11**	0.08	0.13*
Controls	Yes	Yes	Yes	Yes	Yes
Firm & Year	Yes	Yes	Yes	Yes	Yes
Adj-R^2	0.64	0.64	0.64	0.42	0.64
n	391	391	394	340	394
Observations	4,454	4,454	4,372	1,482	4,454

Table VII
Proportion of Firms Issuing Bonds by Year

This table reports the number of firms that issue bonds each year of the sample period. For each year, the number of firms eligible to issue debt (Potential Repeat Issuers) is estimated by summing the number of unique firms that have existing debt trading in the secondary market. The credit rating for firms that are not issuing new debt is estimated using the existing issues. In the instances that current issues have multiple credit ratings, or if multiple ratings differ among agencies, the median credit rating across all issues is used. The trading data comes from TRACE, while the issuing data comes from Mergent FISD.

	Investment Grade			Speculative Grade			Not Rated		
Year	Potential Repeat Issuers	Issuers	%	Potential Repeat Issuers	Issuers	%	Potential Repeat Issuers	Issuers	%
2002	822	213	0.26	226	39	0.17	642	299	0.47
2003	778	236	0.30	141	43	0.30	771	353	0.46
2004	687	158	0.23	134	42	0.31	891	257	0.29
2005	689	172	0.25	136	32	0.24	895	246	0.27
2006	712	228	0.32	140	61	0.44	809	253	0.31
2007	748	269	0.36	146	70	0.48	766	277	0.36
2008	722	202	0.28	136	29	0.21	712	215	0.30
2009	801	297	0.37	157	61	0.39	617	341	0.55
2010	855	259	0.30	186	78	0.42	571	270	0.47
2011	905	298	0.33	202	60	0.30	519	232	0.45
2012	1,020	408	0.40	218	118	0.54	435	297	0.68

Table VIII
Does Illiquidity Impede Access to Capital?

This table reports coefficient results from a cross sectional probit analysis of the determinants of whether a firm is able to issue new debt. To understand the firm's choice to issue new debt we regress the following equation:

$$Pr(Issued_{k,t} = 1) = \alpha_0 + \beta_1 Avg\ Illiquidity_{k,t-1} + \beta_2 OutstandingDebt_{k,t-1} + \beta_3 Recession_t + \beta_4 Recession_t * AvgIlliquidity_{k,t} + \varepsilon_{k,t}.$$

The dependent variable is an indicator variable equal to one if a firm k issues new debt in year t, zero otherwise. To be included in the sample the firm must have existing debt that currently trades in the secondary market. The principal independent variable is the average monthly illiquidity of existing bonds issued by the same firm in the year prior. We include as control variables the median credit rating of the existing bonds issued, the log of the outstanding debt issued by the firm at the end of the prior year, an indicator variable that marks the year 2008 and 2009 as crisis years, and an interaction of the firm's illiquidity variable and the recession variable. Robust test statistics are reported in parentheses, with ***,**, and * indicating significance at the 1%, 5%, and 10% levels respectively.

	Probit (Issuer = 1)				
	(1)	(2)	(3)	(4)	(5)
	PNT	KO	Amihud	Cov.	Adj. TO
Intercept	-0.19	-2.24***	-2.69***	-2.51***	-0.58**
	(-0.69)	(-7.22)	(-7.63)	(-5.47)	(-2.08)
Prior Year Illiquidity	-0.14**	-0.12***	-0.06***	-0.10***	0.04**
	(-2.02)	(-9.38)	(-8.27)	(-7.95)	(2.39)
Prior Year Outstanding Debt	0.00	0.04***	0.06***	0.10***	0.03**
	(0.12)	(4.28)	(5.83)	(6.36)	(2.51)
Recession	0.21***	-0.20	0.51	0.40	-0.03
	(2.97)	(-0.64)	(1.30)	(1.50)	(-0.36)
Recession * Prior Year Illiquidity	-0.36***	-0.02	0.02	0.03	0.00
	(-3.57)	(-0.69)	(1.30)	(1.17)	(0.02)
Firm and Credit Fixed Effects	Yes	Yes	Yes	Yes	Yes
N	2,473	2,460	2,455	2,135	2,473
Observations	17,870	16,179	16,123	8,638	17,842

Table IX
TRACE Reporting of New Debt Issuances

This table reports the number and volume of new issues during the years 2002-2006. During this sub-period, FINRA reported trades of bonds in waves depending on issue size and credit rating. We report the average number of new issues that are reported on TRACE at issuance.

	All New Issues		TRACE reported		Not Reported		Percent Trace
	#	Volume	#	Volume	#	Volume	
2002	229	$86,522,700	59	$58,475,000	170	$28,047,700	26%
2003	777	374,147,728	399	266,239,800	378	$107,907,928	51%
2004	546	313,509,987	398	280,635,237	148	$32,874,750	73%
2005	500	294,787,014	478	262,742,014	22	$32,045,000	96%
2006	566	386,532,825	566	386,532,825	0	0	100%
Total	2618	$1,455,500,254	1900	$1,254,624,876	718	$200,875,378	

Table X
The Real Effect of Price Impact on Issuing Costs

This table presents cross sectional regression results of the impact of TRACE reporting on underwriting costs. The independent variable includes one of the costs of underwriting, which are the yield to maturity at issuance, the gross spread paid to the underwriting syndicate, and the difference between the yield to maturity and the treasury yield at the time of issuance. The principal independent variable is an indicator variable equal to one if the bond is TRACE reported beginning at issuance, zero otherwise. Control variables include the coupon rate, years to maturity, log of the issue size, and indicator variables equal to one if the bond is callable and convertible. We include crediting rating dummy variables, as well as firm fixed effects. Robust z-statistics are reported in parentheses, with ***,**, and * indicating significance at the 1%, 5%, and 10% levels respectively.

	2002-2003			2002-2005		
Panel A: PNT	Yield	Treasury	Gross	Yield	Treasury	Gross
Prior Bonds Trace Reported	-0.05	-0.08	-1.11***	-0.01	-0.23***	-1.12**
	(-0.42)	(-1.33)	(-2.59)	(-0.11)	(-6.33)	(-2.09)
PNT	-0.07	-0.19**	0.40	-0.11	-0.16***	0.40
	(-0.31)	(-2.27)	(0.81)	(-0.69)	(-2.79)	(0.92)
Adj-R^2	0.43	0.58	0.57	0.4	0.58	0.57
n	444	416	446	444	416	446
Observations	822	576	825	1,484	1,085	1,488
Panel B: KO Illiquidity	Yield	Treasury	Gross	Yield	Treasury	Gross
Prior Bonds Trace Reported	0.00	-0.22***	-1.07**	0.00	-0.22***	-1.07**
	(0.06)	(-6.12)	(-2.09)	(0.06)	(-6.12)	(-2.09)
Log Kyle Obizhaeva Illiquidity	0.05	0.17***	0.10	0.05	0.17***	0.10
	(0.71)	(7.74)	(0.39)	(0.71)	(7.74)	(0.39)
Adj-R^2	0.43	0.59	0.57	0.43	0.59	0.57
n	438	411	441	438	411	441
Observations	1,468	1,078	1,472	1,468	1,078	1,472
Panel C:	Yield	Treasury	Gross	Yield	Treasury	Gross
Prior Bonds Trace Reported	0.01	-0.23***	-1.09**	0.01	-0.23***	-1.09**
	(0.12)	(-6.43)	(-2.16)	(0.12)	(-6.43)	(-2.16)
Log Amihud Illiquidity	0.04***	0.04***	0.08	0.04***	0.04***	0.08
	(3.45)	(5.42)	(1.10)	(3.45)	(5.42)	(1.10)
Adj-R^2	0.43	0.59	0.57	0.43	0.59	0.57
n	443	414	445	443	414	445
Observations	1,451	1,077	1,455	1,451	1,077	1,455
Panel D: Covariance	Yield	Treasury	Gross	Yield	Treasury	Gross
Prior Bonds Trace Reported	-0.01	-0.21***	-1.24**	-0.01	-0.21***	-1.24**
	(-0.15)	(-5.78)	(-2.36)	(-0.15)	(-5.78)	(-2.36)
Log Covariance Illiquidity	0.08***	0.06***	0.02	0.08***	0.06***	0.02
	(4.00)	(7.29)	(0.32)	(4.00)	(7.29)	(0.32)
Adj-R^2	0.45	0.62	0.57	0.45	0.62	0.57
n	420	390	421	420	390	421
Observations	1,345	991	1,347	1,345	991	1,347
Panel E:	Yield	Treasury	Gross	Yield	Treasury	Gross
Prior Bonds Trace Reported	-0.00	-0.23***	-1.12**	-0.00	-0.23***	-1.12**
	(-0.05)	(-6.34)	(-2.08)	(-0.05)	(-6.34)	(-2.08)
Log Turnover Illiquidity	0.03*	0.01**	-0.06	0.03*	0.01**	-0.06
	(1.79)	(2.14)	(-0.82)	(1.79)	(2.14)	(-0.82)
Adj-R^2	0.43	0.58	0.57	0.4	0.58	0.57
n	444	416	446	444	416	446
Observations	1,484	1,085	1,488	1,484	1,085	1,488

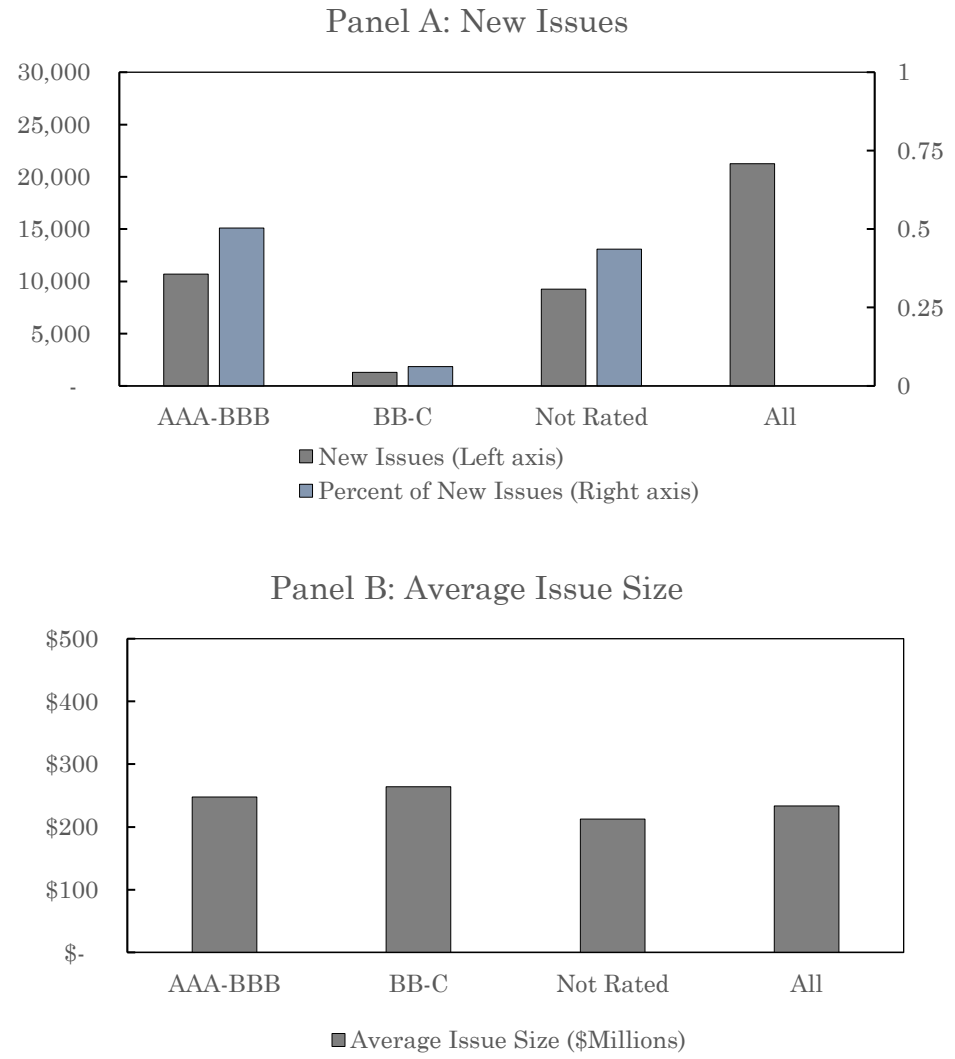

Figure 1. New Corporate Bond Issues (2002-2012)

The figures display the activity of the primary market for corporate bonds between the years 2002 through 2012, partitioned by the rating at the time of the issue. Panel A reports the total amount of capital raised through corporate bonds, and Panel B reports the average issue size. Both figures are aggregate totals of the entire sample of firms issuing bonds.

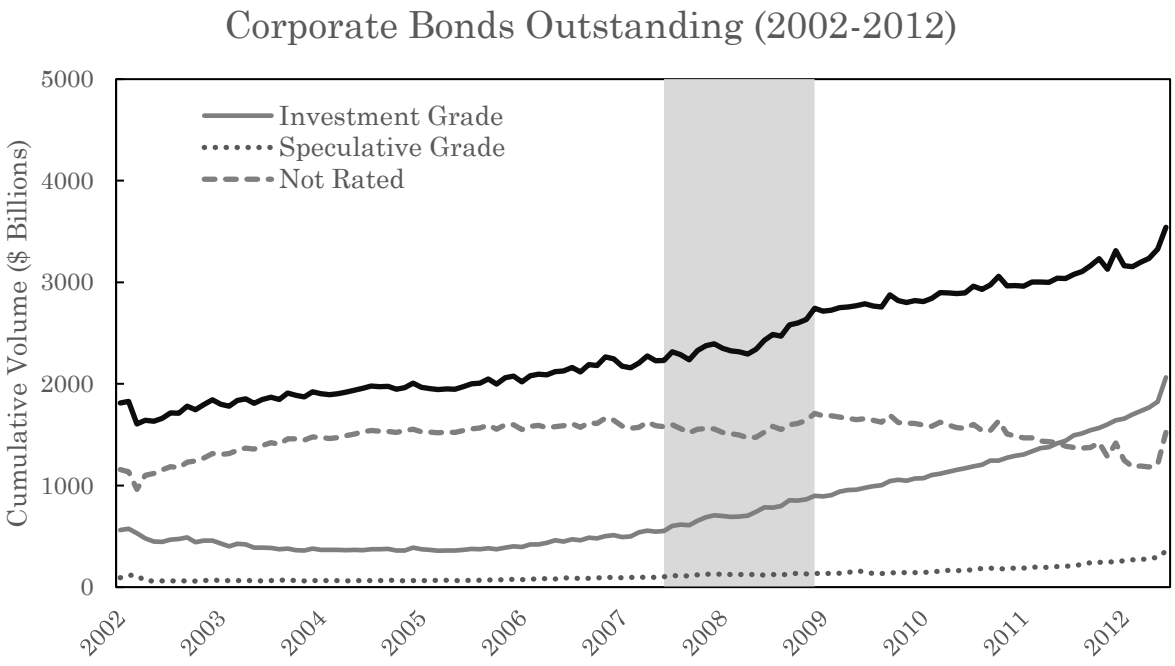

Figure 2. Monthly Corporate Debt Outstanding (2002-2012)
The figure displays the aggregate amount of corporate debt outstanding for the sample period January 2002 through December 2012.

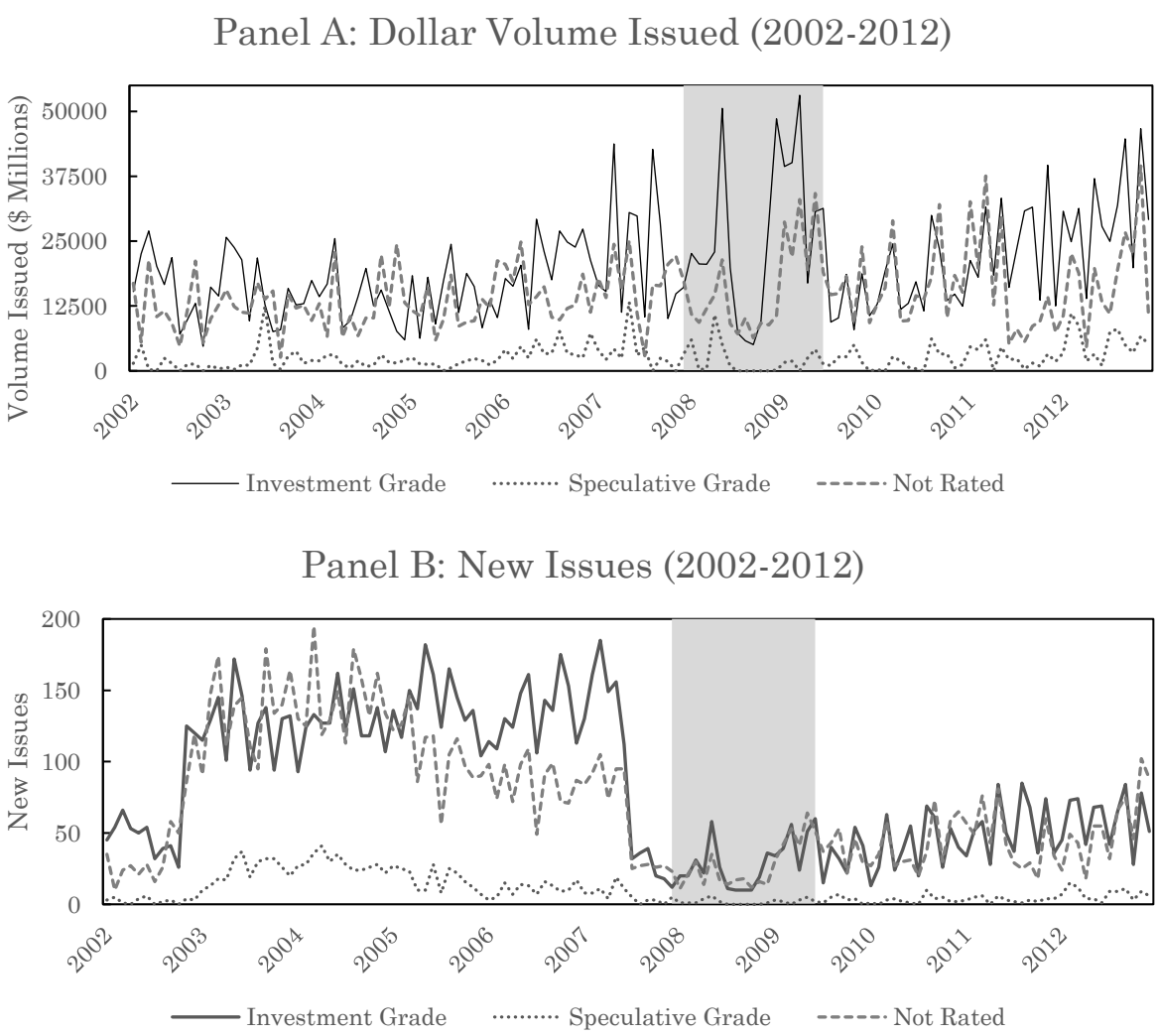

Figure 3. Monthly Corporate Bond Issues (2002-2012)

The figure displays the monthly amount of capital issued through U.S. corporate bonds during the sample period January 2002 through December 2012. Panel A reports the monthly volume issued. Panel B reports the number of monthly issues.

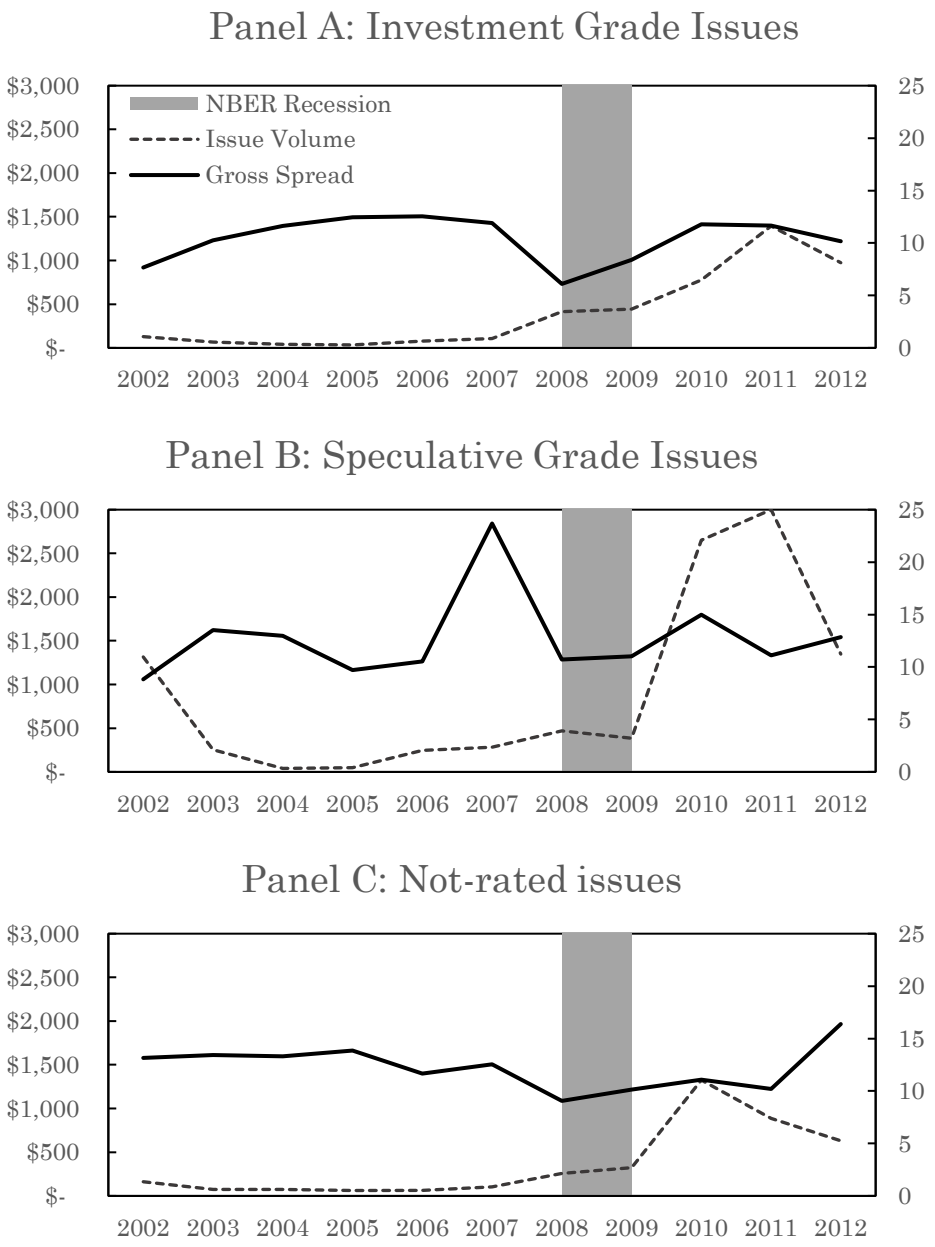

Figure 4. **Bond Trading Volume and fees from 2002-2012**

This figure displays the yearly average trading volume alongside the gross spread, the percentage of the issue amount paid to the underwriting syndicate. Panels A, B, and C report issues for investment grade, speculative grade, and non-rated grade issues respectively. Issue volume and gross spread are averaged by firm and by issue.

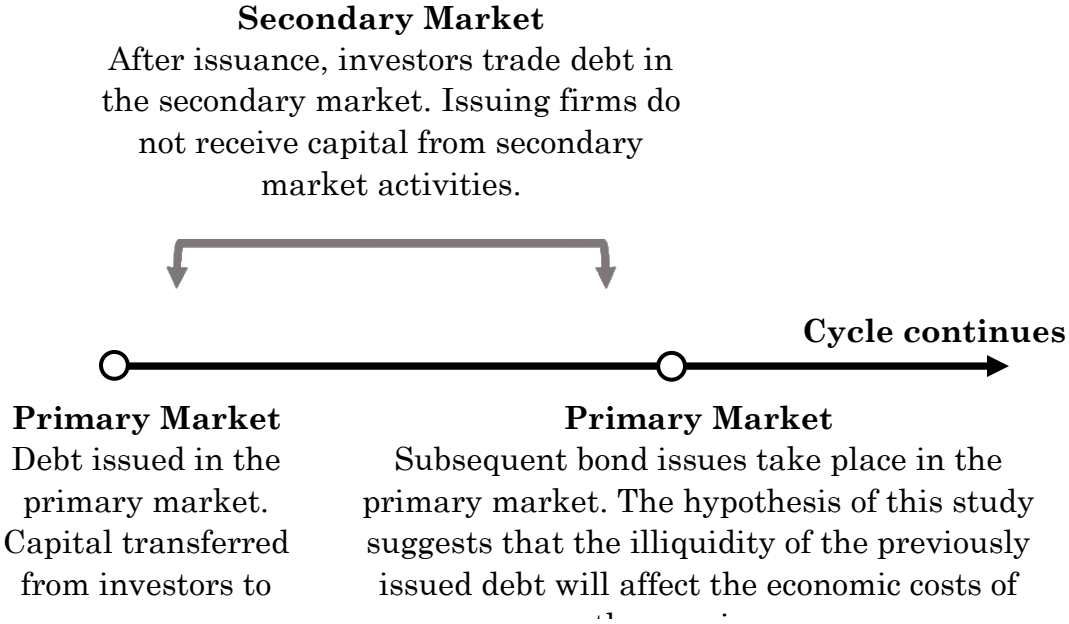

Figure 5. **How Secondary Market Liquidity Affects Underwriting Costs**
This study links secondary market activity with primary market economic costs. When considering liquidity, this paper postulates that the characteristics of previously issued bonds will influence the fees associated with the new issue. The underwriter and investors estimates the potential risks of the current bond by examining past performance of any outstanding bonds by the issuing firm.