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Liquidity in the 144A Debt Market

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I am submitting herewith a dissertation written by Karen Ann Craig entitled "Liquidity in the 144A Debt Market." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Business Administration.

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Liquidity in the 144A Debt Market

A Dissertation Presented for
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Dedication

I dedicate this to Phill, Lily and Hannah

Acknowledgements

Abstract

This dissertation presents my research analyzing the liquidity component of corporate bond spreads for bonds issued privately under Rule 144A during the period 2003 – 2011. Rule 144A bonds are limited to trading among qualified institutional investors and therefore are inherently less liquid than registered corporate bonds. I assess an amendment to Rule 144 modifying the restrictions on public resale of Rule 144A bonds intended to increase the liquidity of 144A bonds and decrease the cost of capital to firms issuing these securities. This amendment provides an ideal exogenous shock to evaluate 144A bonds. Assessing the liquidity premiums and yield spreads on the bonds before and after the amendment, I provide evidence of the 2008 amendment's impact on bond liquidity and cost of debt. Specifically, I find that the liquidity premium for Rule 144A bonds has increased since the amendment and the yield spreads have increased accordingly. This indicates the amendment did not have the desired regulatory impact of lowering the liquidity premium.

I also assess a unique aspect of the 144A bond market. Specifically, that certain 144A bonds are accompanied by registration rights agreements resulting in the 144A issue being exchanged for registered debt. I analyze the impact of the 2008 amendment on registration rights finding that the probability of a bond having a registration rights agreement has decreased since the 2008 amendment.

These new insights on 144A liquidity facilitate improved understanding of the yield premiums paid on 144A bonds and helps contribute to a distinct sector of the debt market by evaluating a market which is highly illiquid.

Table of Contents

List of Tables

List of Figures

The most interesting markets to study liquidity are those in which liquidity is a problem, such as the real estate market, or the corporate bond market, where transactions are few and far between, for all but a small subset of the assets.

Mahanti et al. (2008)

1. Introduction

Asset pricing theory suggests that an asset with more sensitivity to risk factors, such as default and liquidity, should offer investors higher returns for holding that asset. Therefore, understanding the drivers behind pricing is essential in developing a cohesive asset pricing theory. Pastor and Stambaugh (2003) propose that stock returns should be priced with a premium for exposure to market liquidity shocks. The authors support their theory, finding the expected return of a stock is an increasing function of the sensitivity to market-wide liquidity shocks. Confirming this, Acharya and Pedersen (2005) determine that the required rate of return of an asset is dependent on the expected liquidity and covariance of returns and liquidity between the asset and the market. Furthermore, Pastor and Stambaugh (2003) suggest that it "would also be useful to explore whether some form of systematic liquidity risk is priced in other financial markets, such as fixed income markets…"

My research evaluates liquidity in a subset of fixed income markets, specifically, the Rule 144A[1] market. The Rule 144A market allows the private placement of debt with certain institutions without registering the debt with the Securities and Exchange Commission (SEC). Fixed income markets provide an opportune environment for evaluating the effects of liquidity on asset prices due to their known cash flows. In addition, the bond market is less liquid[2] than

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[1] 17 CFR §230.144A, Private resales of securities to institutions
[2] Manhanti, et al., (2008) find in their comprehensive custodial sample of registered bonds from State Street Corporation that over 40% of the bonds do not even trade once a year.

the equity market and therefore, liquidity can be an important consideration for firms wishing to raise capital and potential bondholders looking to invest. Bond liquidity has wide ranging financial impacts, including the price investors are willing to pay for a bond and the yield that the bond offers. Therefore, the liquidity level of debt is a concern to issuers and investors, with investors requiring a premium on bonds with low liquidity.

While liquidity is often thought of as the frequency of trading a security, a more comprehensive view of liquidity, especially in the bond market where bonds do not trade frequently, includes the costs and risks born by the investor. Amihud et al. (2005) detail the sources of liquidity including exogenous transaction costs, demand pressure, inventory risk and the difficulty of locating a counter party. When a security is traded, the transaction costs from the purchase and any anticipated future sale costs will be required to be reimbursed to the investor by way of a liquidity premium. Demand pressure and inventory risk occur because the market may not always be able to match buyers and sellers, and therefore, market makers who purchase the securities require a liquidity premium for holding these securities in compensation for the risk of price changes. (Amihud et al., 2005) These sources of liquidity result in investors requiring a higher required return, which is the liquidity premium I am evaluating.

Understanding liquidity is important to bond market participants, regulators and academics. For firms issuing bonds, it is essential they know how bond prices are influenced by liquidity and other bond risk factors. This can assist in the decision of issuing bonds: what type of bond to issue and in what market. Understanding liquidity for an investor helps to determine the appropriate required return based on the liquidity risk of the investment. Academics seek to comprehend the role liquidity plays in bond pricing to fully understand how bonds are priced and determine the cost of borrowing.

To identify the drivers behind bond pricing, such as liquidity, all markets must be included. Until now, corporate bond liquidity studies have focused only on the registered bond market[3]. My paper will be the first known paper to evaluate the liquidity premium associated with privately placed debt.

The Rule 144A debt market has significant economic importance to firms raising capital and investors looking to participate in the market. In 2010 alone, firms issued over $1 trillion dollars in registered and Rule 144A bonds with over half of that debt, $582 billion, issued through the 144A market. This is almost three times the $201 billion raised by IPOs and secondary offerings in the same year. It is clear that at over 50% of the debt market for 2010, the 144A market is a viable and primary means for firms to raise capital. Therefore, research on Rule 144A bonds can further the understanding of a market responsible for a significant source of capital and an economically significant avenue of investment. Understanding the impact liquidity has on bond pricing is an important component in determining the costs of borrowing.

The financial literature on liquidity and asset pricing is extensive and best summarized in a survey by Amihud, Mendelson and Pedersen (2005). This survey reviews the theory behind liquidity and required returns and presents empirical relationships between liquidity and asset prices. Subsequent to this survey, Chen, Lesmond and Wei (2007) evaluate the effects of liquidity on bond yields for both investment grade and high yield bonds. Using investment grade and high-yield registered corporate bonds from the period 1995 – 2003, the authors find lower-rated bonds are less liquid and there is a significant positive effect of liquidity on yield spreads.

Recent bond liquidity research has focused on developing a single measure of liquidity. Bao, Pan, and Wang (2011) extract an aggregate liquidity measure using investment grade

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[3] Registered bond liquidity studies include: Longstaff, Mithal and Neis (2005), Chen, Lesmond and Wei (2007), Bao Pan and Wang (2011).

bonds. Dick-Nielsen, Feldhutter and Lando (2011) measure liquidity using an equally weighted sum of four variables[4] that measure liquidity and the systematic and unsystematic liquidity risk of a bond. A problem using these types of liquidity measures across all bonds is they rely on transaction information which is not frequently available for lower grade bonds or bonds that are issued privately. Bushman, Le, and Vasvari (2010) propose an implied liquidity measure that is computed by aggregating the liquidity preferences of the bond owners. By assigning a liquidity value based on the bondholders' preference to hold liquid or illiquid securities, this measure can be applied to bonds without transaction data; however, this method requires bondholder identity and holding information be available.

Li, Shi and Wu (2006) and Chang and Hung (2010) overcome the lack of transaction information and bondholder data by implementing a liquidity measure derived from differencing the yield between on-the-run and off-the-run Treasuries as a proxy for corporate liquidity. They argue that employing the liquidity of Treasuries as a proxy for corporate bond liquidity is appropriate because the liquidity from Treasuries influences the prices of other assets. Chang and Hung (2010) use the findings of the strong cross-market liquidity correlation between Treasury and corporate bonds from Longstaff (2004) to affirm that liquidity has a cross-market effect and the spread of corporate bonds is proportional to the difference in yields between on- and off-the-run Treasuries.

My research differs from other bond liquidity research in that it focuses directly on private debt issued under Rule 144A of the Securities Exchange Act of 1933 (Securities Act). Rule 144A allows exemption to the registration requirements of the Securities Act for debt issued with specific types of institutional investors. The restrictions imposed on bonds issued

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[4] Variables include: Amihud (2002) illiquidity measure estimating the price impact of trades; measure of round trip trading costs; variability of Amihud's measure; variability of round trip trading costs

under Rule 144A make an ideal scenario for studying liquidity. Measuring the liquidity of 144A bonds is difficult because the most common measures of liquidity require trading information that is not available in the evaluation of an asset such as 144A bonds. Insight on 144A liquidity adds to the understanding of pricing securities by facilitating improved knowledge of the yield premiums paid on 144A bonds in addition to bond characteristics that impact liquidity.

To determine the liquidity premium associated with the Rule 144A market I use a matched sample approach, matching by propensity score.[5] By matching on specific bond characteristics, I am able to determine the liquidity premium on Rule 144A bonds above that paid on a similar registered bond. I use ordinary least squares and firm fixed effects to determine the relationship between the liquidity premium and firm characteristics that proxy for liquidity. In addition, I evaluate the impact of an amendment to Rule 144[6], the rule that allows public resale of Rule 144A bonds, to determine if the amendment lowered the liquidity premium. I also evaluate the impact the amendment had on registration rights agreements.

I find a statistically significant change in the liquidity premium priced into Rule 144A bonds after the SEC amended the rules governing the resale of these bonds. While the stated objective of the amendment was to lower the liquidity premium and hence a firm's cost of debt, my results find an increase in liquidity premium indicating that the regulation change did not serve its stated purpose of lowering the liquidity premium. I also find a statistically significance difference between Rule 144A and registered bond yield spreads of approximately 2%. The yield spread on the Rule 144A bonds is larger than registered bonds reflecting the higher default risk and lower liquidity characterized by the Rule 144A market. In addition, I find the probability that a Rule 144A bond is issued with a registration rights agreement, requiring the

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[5] Other financial and accounting literature using a similar propensity score matching approach include: Campello et al. (2010), Chava and Purnanandam (2011), McInnis and Collins (2011)
[6] 17 CFR §230.144, Persons deemed not to be engaged in a distribution and therefore not underwriters

issuer to replace the Rule 144A debt with registered debt, has declined since the amendment indicating the reduced holding periods of the amendment decreased the need for investors to require a registration rights agreement.

This research contributes to the literature on bond liquidity and extends the literature on the impact of Rule 144A debt offerings on bond yields by using liquidity to explain bond yields. The remainder of this paper is organized as follows: Section 2 provides a literature review on liquidity in asset pricing and the Rule 144A debt market; Section 3 provides background on Rule 144A and Rule 144; Section 4 contains a description of the methodology used for analysis of the data; Section 5 discusses the data and provides summary data statistics; Section 6 presents the regression analysis; and Section 7 concludes the paper. All tables are provided in Appendix A of the Appendices and figures are provided in Appendix B.

CHAPTER 1: Asset Pricing, Liquidity and Rule 144A Review

2. Review of Asset Pricing, Liquidity and Rule 144A Literature

2.1 Liquidity and Asset Prices

Early research on liquidity tests whether two assets with different liquidities have the same price. This early literature [e.g., Amihud and Mendelson (1986a, 1986b), Pastor and Stambaugh (2003)] focuses on equity prices. The literature on liquidity of equity prices further expands to include the evaluation of liquidity on U.S. Treasuries [e.g., Amihud and Mendelson (1991), Kamara (1994), Longstaff (2004)]. Because default risk is not priced in U.S. Treasuries, liquidity can be easily determined and therefore, this literature evaluates if the difference in pricing for Treasuries of the same maturity is due to liquidity. Subsequent to the research relating to the liquidity of Treasuries, the research expands to examine the liquidity priced into corporate bonds [Houweling, Mentick and Vorst (2005), Longstaff, Mithal and Neis (2005), Chen, Lesmond and Wei (2007)]. I summarize this progression of liquidity research below.

The effect of liquidity on asset prices is studied by Amihud and Mendelson (1986a). Using bid-ask spreads as a measure of liquidity, Amihud and Mendelson (1986a, 1986b) study the effects of liquidity on stock returns using varying types of investors with different expected holding periods. In their basic model, a risk neutral investor will take into account transaction costs of selling when valuing a security. The investor will account for all future streams of transaction costs in this valuation. Based on this, the authors pose that the price discount due to illiquidity is the present value of the expected transaction costs over the life of the security. As such, the required return on this security will be equal to the required return on a perfectly liquid identical security plus the expected trading cost per period.

Noting that the costs of the bid-ask spread have to be borne once over the holding period, the Amihud and Mendelson evaluate the holding period effect on the return-spread relationship. Investors with a preference for longer holding periods will be able to amortize the costs of the bid-ask spread over a longer period of time than those investors with a preference for short holding periods. This longer holding period means investors that prefer longer holding periods pay a lower transaction cost per unit time. Thus, investors with preference for shorter holding periods will be willing to pay a premium for securities with lower bid-ask spreads to lower their transaction costs per unit time. Gross required return should then increase at a decreasing rate as the bid-ask spread increases. If two securities that generated the same cash flow had the same return but different bid-ask spreads investors would prefer the security with the lower bid-ask spread. As such, gross returns should increase as the bid-ask spread increases.

Amihud and Mendelson (1986a, 1986b) use monthly stock returns from the New York Stock Exchange (NYSE) from 1961 – 1980 to test the hypothesis that "expected stock return is an increasing and concave function of the spread." In other words, return increases at a decreasing rate. Using a spread variable of the average of the beginning and end-of-year relative spreads[7], the authors perform three main regressions. The first tests the relationship of expected stock returns and beta using the Capital Asset Pricing Model (CAPM). The second adds the spread variable as a determinate of expected return and the last regression tests the relationship of only the spread variable on expected returns. Their results find a significant positive relationship between returns and beta using CAPM; however, when the spread variable is included, the spread value becomes highly significant for explaining expected returns while beta becomes a weak explanatory variable. Using the spread variable only to estimate expected

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[7] relative spreads calculated as the dollar spread divided by the average of the bid and ask prices at the end of the year

returns, Amihud and Mendelson find a strong and significant positive relationship, confirming that higher spread stocks have higher excess returns. They also find their slope coefficients of the spreads to be positive and generally decreasing confirming returns are increasing at a decreasing rate.

While Amihud and Mendelson (1986a, 1986b) evaluate the relationship of expected returns to the level of liquidity, Pastor and Stambaugh (2003) evaluate the relationship of expected returns to systematic liquidity risk to determine if liquidity is a state variable important in pricing stock. In short, they investigate whether stocks with greater exposure to market liquidity shocks earn higher returns. Their measure of liquidity depends on the principle that order flow results in lower liquid stocks having greater return reversal the next trading day. The measure of liquidity used for stock i in month t is obtained from the OLS estimate of $\gamma_{i,t}$ in the regression:

$$r^e_{i,d+1,t} = \theta_{i,t} + \phi_{i,t}r_{i,d,t} + \gamma_{i,t}sign(r^e_{i,d,t})\upsilon_{i,d,t} + \epsilon_{i,d+1,t}$$

Where:

$r_{i,d,t}$ is the return on stock i on day d in month t

$r^e_{i,d,t}$ is the difference between $r_{i,d,t}$ and the return on the CRSP value-weighted market return on day d in month t

$\upsilon_{i,d,t}$ is the dollar volume for stock I on day d in month t

$sign(r^e_{i,d,t})$ is an indicator whose value is 1 if $r^e_{i,d,t}$ is positive and -1 if negative

In this equation, order flow is proxied by the volume signed by the contemporaneous excess return on the stock. If the market is not perfectly liquid the unbalanced order flow should be associated with a partially reversed return. This means the liquidity measure, γ, should be negative and larger when equity liquidity is lower. The authors find that this measure appears

important in stock prices. Their findings show stocks that are more liquidity have higher returns and smaller stocks are less liquid and are more sensitive to liquidity.

Transitioning the study of liquidity from equity to bonds, Amihud and Mendelson (1991) evaluate the effect of bond liquidity on yields using U.S. Treasury securities. Specifically, the authors evaluate if liquidity has a similar impact on the pricing of bonds as it does on stocks and if so, does the effect relate to the bond's time to maturity. Because brokers provide liquidity in the U.S. Treasury market, buyers and sellers can trade instantaneously, reducing the need for individual investors to find compatible trading partners. Therefore, the fees charged by the brokers are associated with the liquidity of the Treasury; specifically, lower fees, by way of lower bid-ask spreads, are associated with greater liquidity.

In order to measure the liquidity of Treasuries Amihud and Mendelson select U.S. notes and bills with fewer than six months to maturity. By the time notes approach maturity they are considered off-the-run, no longer trading, and are less liquid than bills. On the other hand, the short-term maturities of bills make them highly liquid. As stated previously, lower transaction costs reflect higher liquidity. Comparing bills and notes permits the comparison of identical underlying cashflows, enabling the measuring of the Treasuries' liquidity. Amihud and Mendelson (1991) therefore specifically test if these "bills, which have lower transaction costs, will have a lower yield to maturity than notes."

Employing data from the quote sheets of First Boston Corporation for 37 trading days between April and November 1987, Amihud and Mendelson compile data for bills and notes with fewer than six months to maturity. Using the annualized yield to maturity relative to the ask price for each Treasury, they find that the typical bid-ask spread on notes, on the order of 1/32 of a point, is four times that of bills with a typical bid-ask spread of 1/128. This reflects the lower

liquidity of Treasury notes. They also find the yield to maturity on notes is higher than for a bill of equal maturity. Both of these findings confirm that asset returns are a function of liquidity.

Kamara (1994) follows up on Amihud and Mendelson's (1991) finding by exploring the determinants leading to the differences in the yield to maturity of Treasury notes and bills. Like Amihud and Mendelson (1991), Kamara also uses Treasury bills and notes with identical underlying cash flows. To measure the liquidity risk of these Treasuries, Kamara uses 91 observations of bid prices for Treasury bills and notes with fourteen weeks to maturity between the period of January 1977 to July 1984. By regressing the difference in yields between notes and bills on proxies for liquidity, discount and premium variables and changes in dealers' net positions of bills and notes, the author finds the note-bill differential reflects the difference in liquidity risk.

Longstaff (2004) continues the study of the liquidity of Treasuries reviewed by Amihund and Mendelson (1991) and Kamara (1994) by testing the effect of liquidity on bond yields using bonds issued by the Resolution Funding Corporation (Refcorp). Refcorp is an agency established by Congress in 1989 to issue bailout bonds as a result of the savings and loan crisis of the 1980s. These bonds are guaranteed by the U.S. government and, therefore, are default-free and of the same credit risk as U.S. Treasuries. Longstaff uses Bloomberg to collect month-end yields for Treasury bonds and Refcorp zero-coupon bonds from April 1991 to March 2001. He finds a large liquidity premium priced into Treasury bonds. The spread between the Refcor and Treasury bonds is statistically and economically significant. Longstaff also tests if there is a flight-to-liquidity premium, when market participants prefer to hold securities with a higher liquidity, in Treasury bond prices. By regressing the month end liquidity premium on measures of Treasury bond popularity that include consumer confidence index, change in the amount of

Treasury debt held by foreigners, percent change in the amount of funds held in money market mutual funds, the percent change in the amount of funds held in equity market funds and the change in the amount of Treasury securities available to investors, Longstaff finds a strong relationship between the liquidity premium and the aforementioned Treasury popularity variables used in the regression analysis.

Houweling, Mentick and Vorst (2005) test the pricing of liquidity in the euro corporate bond market. Using a liquidity portfolio based approach, the authors test whether their portfolios have significantly different yields. They use the following variables to proxy for liquidity: issued amount, an equity listing indicator, a Euro bond denomination indicator, an on-the-run indicator, bond age, missing price indicator, yield volatility, the number of contributors, and yield dispersion. The initial bond sample consists of bonds obtained from the Lehman Brothers Euro-Aggregate Corporate Bond index. Houweling, Mentick and Vorst collect bond characteristics from Bloomberg and Reuters 3000 Extra provides the daily bid yields for the period January 1999 to May 2001 for a total sample size of 1,190 bonds. The authors find that all liquidity proxies are statistically significant for liquidity effects with the exception of the equity listing indicator.

Longstaff, Mithal and Neis (2005) assess the credit default swap market for evidence of default risk or liquidity in corporate yield spreads. Using the credit default premium the authors provide a direct measure of the size of the default and non-default components of the corporate yield spread. Testing this measure on a case study of Enron, the authors use 5-year credit default swaps between December 5, 2000 and October 22, 2001. While they find the default component of corporate debt accounts for a majority of the spread they also find evidence of a significant non-default component. Regressing this non-default component on proxies for liquidity they

find a strong relationship with corporate bond liquidity. Liquidity proxies in their analysis include: average bid-ask spread, amount outstanding, age of bond, time to maturity, financial firm indicator and high rated bond indicator. They find that age of the bond is not statistically significant but all other proxies are significant.

As follow-on to Longstaff, Mithal and Neis (2005) suggesting bond liquidity as a possible explanation for yield spread variations, Chen, Lesmond and Wei (2007) assess bond-specific liquidity using corporate bonds from 1995 to 2003. Their analysis employs the following liquidity measures: bid-ask spread, the LOT measure of liquidity[8] and the percentage of zero returns[9]. The authors find liquidity is priced into the corporate yield spreads of investment grade and high yield bonds. Also using bond time to maturity, age, amount outstanding, bond volatility and bond rating to explain yield spreads, the authors find all of their liquidity measures are positively related to the yield spread.

Recent literature on liquidity focuses more on developing new measures for liquidity than the previous literature that explained the yield spread with various liquidity proxies. These new measures are mainly based on trade data, data that is not always available for less liquid bonds and is not publicly available for Rule 144A bonds. Bao, Pan and Wang (2011) develop a measure of liquidity based on the autocovariance in relative price changes. They use trade-by-trade prices or end of day prices in order to develop their measure of liquidity. This process requires that bonds must trade on at least 75% of all business days and at least ten price changes between the observed and lagged prices are required to develop the measure. The authors acknowledge that the bonds in their sample are more frequently traded than typical bonds but argue that this bias supports their position on the importance of illiquidity in determining yield

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[8] Limited dependent variable model proposed by Lesmond et al. (1999)
[9] The effect of liquidity observable through the incidence of zero returns, Bekaert et al. (2005).

spreads. Using the Trade Reporting and Compliance Engine (TRACE) data between April 2003 and June 2009 they evaluate their liquidity measure on investment grade bonds and find it statistically and economically significant. Their results find that, with a one standard deviation difference in bond liquidity, two equally rated bonds have a difference in yield spreads as large as 65 bps. Their results find liquidity decreases with bond age, decreases with time to maturity, but increases with a bond's issue amount.

Bushman, Le and Vasvari (2010) recognize the issue with measuring liquidity when transaction data is unavailable and develop a measure of liquidity that is independent of pricing and trade data. They base their measure of liquidity on the bondholders' investment choices. If an investor tends to hold more liquid securities, then they consider the bond to be more liquid. This method has the advantage of being applied without transaction data but only applies where bond holder data is available. Using TRACE data for firms with publicly traded equity from January 2002 to December 2008, they compare their liquidity measure to three popular transaction based liquidity measures: Amihud (2002) measure, Roll (1984) measure and a price dispersion measure. The authors find that their liquidity measure can significantly explain yield spreads and they are able to quantify a bond's systematic liquidity risk using their measure.

Dick-Nielson, Feldütter, and Lando (2011) also develop a new liquidity measure and analyze corporate bond spreads around the subprime crisis. Their measure of liquidity is an equally weighted sum of four variables: Amihud's measure of price impact, a measure of roundtrip cost of trading, and the variability of each of these two measures. The authors regress the yield spread on measures of default and liquidity risk. Specifically they control for default risk by the ratio of operating income to sales, ratio of long-term debt to assets, leverage ratio, equity volatility and pretax interest dummies. To control for liquidity the authors include bond

age, amount issued, coupon rate and time-to-maturity. Using investment grade and high-yield bonds from 2005 to 2009, they find a slow and persistent increase in liquidity for investment grade bonds with high-yield bonds exhibiting a stronger but a more short live increase in liquidity.

2.2   Rule 144A Market

Little has been written regarding the Rule 144A market since its inception in 1990. Early research on the Rule 144A market is published by Fenn (2000). Fenn focuses this research on the evaluation of high-yield straight debt issuances[10]. Fenn evaluates the Rule 144A market from 1993 to 1998 and documents the shift of high-yield bonds from the registered market to the Rule 144A market and also notes that 97% of the high-yield bonds in his sample are subsequently registered with the SEC.[11] Fenn's research mainly assesses the information disclosure between registered bonds and Rule 144A issues. He uses the bond yield spread as the dependent variable and proxies for inadequate disclosure with Rule 144A indicators, first time bond issuer indicators and privately owned indicators. He also controls for rating, issue size, maturity, ranking of the bond as senior debt, the spread between Merrill Lynch 175 high yield index over Treasuries and includes a time trend. Results of this study find that these premiums for inadequate disclosure have vanished over time and the author proposes that the investors do not value the information provided by registration of bonds. He also proposes, but does not test, that the vanishing premiums indicate that investors do not regard Rule 144A issues as less liquid than their registered counterparts. My research specifically evaluates this proposition by comparing the yield spreads between Rule 144A and registered bonds.

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[10] Fenn excludes foreign issuers and financial issuers stating they are only a small fraction of the high yield market. Foreign issuers account for over 36% of my Rule 144A sample and over half of my sample is high-yield debt.
[11] Registration typically occurs between 90 and 210 days

Livingston and Zhou (2002) continue the literature on Rule 144A bonds and evaluate the impact of Rule 144A debt on bond yields and underwriting fees by evaluating 1,418 non-convertible, fixed coupon rate bonds issued between 1997 and 1999. Their results differ from Fenn (2000) finding yield premiums are higher for debt issued under Rule 144A than for registered debt. In reproducing Fenn's results they explain this difference by concluding Fenn's model is sensitive to time period and model specifications. The authors find that high-yield bonds issued under Rule 144A have higher yield spreads than investment grade bonds and yield spreads for Rule 144A issued bonds are higher when the firm is a non-SEC reporting firm. They pose the higher yield spreads could be due to liquidity differences, information asymmetry and weaker legal protection for investors. My paper evaluates the liquidity difference priced into Rule 144A bonds.

Registration rights are also evaluated by Livingston and Zhou who find that approximately 40% of the investment grade bonds issued in their 144A sample are accompanied with registration rights agreements and 98% of high-yield bonds have registration rights agreements. Evaluating the yields for bonds with registration rights, the authors find that registration rights have a greater impact on the yields for high-yield bonds issued under Rule 144A than for investment grade bonds issued under Rule 144A.

Livingston and Zhou (2002) also evaluate underwriter fees on bonds issued under Rule 144A and registered bonds. They find no statistical difference between the fees on registered bonds and Rule 144A bonds but note that only 30% of their sample reports gross underwriter spread. They explain the finding of no difference to the trade-off between it being harder to underwrite Rule 144A issues because of fewer potential investors and information asymmetry but that Rule 144A issues may be less risky and involve less work. These two effects offset each

other, resulting in a finding of no difference in underwriter fees between Rule 144A and registered bonds.

Chaplinsky and Ramchand (2004) continue the research in the Rule 144A market by specifically evaluating the yield spreads for international firms placing debt privately. They assess fixed rate debt issued by international firms between 1991 and 1997 and limit their sample[12] to industrial issues of long-term[13], fixed rate debt. Their findings show that investment grade Rule 144A foreign bonds have higher yield spreads than foreign investment grade registered bonds, but high-yield Rule 144A issues have yield spreads comparable to high-yield registered bonds. The authors suggest this reveals a bifurcation of the market where high-quality firms issue in both the registered and Rule 144A markets but face higher spreads in the Rule 144A market and lower quality firms issue debt only in the Rule 144A market. They also find that 144A debt issued by foreign firms is smaller in size, shorter in maturity and has lower credit ratings than registered debt issued by foreign firms. Of these firms, they find that they typically do not have equity listed in their home country or in the United States.

Huang and Ramirez (2010) evaluate convertible and straight debt issued in the registered bond market, Rule 144A bond market and bank loan market from 1991 to 2004 assessing the issuer's choice of issuance and include shelf and non-shelf registered debt along with the Rule 144A and bank loan markets. They obtain their debt offerings from Thompson SDC and only evaluate non-financial firms[14]. Their initial sample includes 855 Rule 144A convertible issuances, reducing this further to 554 after screening their data. The sample is larger for straight debt issues with an initial sample size of 2,245 which reduces to 1,414 issues. Using a nested

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[12] This sample consists of 195 bonds issued by international firms in the Rule 144A market and 170 registered bonds issued by international firms.

[13] maturity > 2 years

[14] Financial firms represent 36.68% of my fixed coupon Rule 144A bonds and 75.87% of my fixed coupon registered bonds.

logit regression, the authors evaluate the choice between convertible and straight debt issues. Specific to the Rule 144A market they find an increase in both straight and convertible debt but this migration is from the non-shelf registered market and not from the shelf or bank market.

Huang and Ramirez also document the subsequent registration of bonds issued under Rule 144A. Similar to Fenn (2000) and Livingston and Zhou (2002), they find a large percentage of their sample subsequently registers the debt with the SEC. Specifically, 88% of convertible and 91% of straight debt issued in the Rule 144A market are registered with the SEC. Assessing the time period to register, over 80% of the bonds issued in the Rule 144A have a registration filed within three months of the issue.

CHAPTER 2: Rule 144A and Registered Bond Markets

3. Background on Rule 144A

The Securities Act requires that all securities be registered unless specifically exempted. Rule 144A of the Securities Act, adopted in 1990, provides just this exemption, allowing debt to be issued privately without firms having to register with the SEC. The SEC had two reasons for adopting Rule 144A: the first, increasing liquidity of the private placement market, and the second, making the private placement market more attractive to foreign firms looking to raise capital (Carey et al., 1993).

Rule 144A restricts the sale of securities to qualified institutional buyers (QIBs) who are generally defined under Rule 144A as firms that own and invest, on a discretionary basis, at least $100 million in securities. QIBs are further defined as banks and savings and loans with a net worth of at least $25 million and broker-dealers with a net worth of at least $10 million dollars. QIBs are not considered part of the public and can resell private placements issued under Rule 144A amongst other QIBs without violating the registration requirements of the Securities Act.

Placements under Rule 144A are subsequently regulated under Rule 144 for public resale. Prior to 2008, QIBs were required to hold securities issued under Rule 144A for a period of one to two years before public resale, depending on whether the issuing firm was a reporting or non-reporting issuer to the SEC. If a reporting issuer, the placement had to be held by the QIBs for a minimum of one year prior to trading with the public. For non-reporting issuers, the holding period was set at two years. After the holding period had elapsed, other restrictions, such as public information requirements and trading volume limitations, applied.

In 2008, the SEC amended Rule 144 in order to "increase the liquidity of privately sold securities and decrease the cost of capital for all issuers without compromising investor

protection." (SEC 2007) This amendment reduced by half the holding periods for reporting and non-reporting issuers from one and two years to six months and one year, respectively. In addition, for QIBs that are non-affiliates of the issuer, the volume restrictions for resale are removed. As a result, after the 2008 amendment, a QIB not affiliated with the issuer could publicly trade any volume of a security acquired under Rule 144A after a six month holding period subject only to the restriction that the issuer maintain adequate current public information. My research evaluates the impact this amendment has on the Rule 144A market by assessing the liquidity and the issuing yield spread of Rule 144A bonds before and after the 2008 amendment to determine if the amendment achieved its stated goals of increasing the liquidity and lowering the cost of debt to the issuing firm.

An interesting effect of the Rule 144 holding restrictions is the creation of registration rights agreements that accompany select debt issued under Rule 144A. These agreements specify that the 144A issue will be replaced by registered debt identical in par, coupon and time to maturity within a certain time period, typically less than a year. This replacement is called an A/B Exchange or Exxon Capital exchange named after the SEC no-action letter permitting the practice. My research evaluates if registration rights influence the liquidity of a bond issued under Rule 144A and if the 2008 amendment to Rule 144 impacted the probability a bond would be issued with a registration rights agreement.

4.   Methodology

Liquidity is a difficult concept to quantify. Specific to Rule 144A bonds, information relating to the QIB holders and trades is not available and therefore, I rely on proxies that reflect different aspects of liquidity that have been used in past literature.

My first proxy for the liquidity of Rule 144A bonds employs the difference in the yields between on-the-run Treasuries and the average yield for off-the-run Treasuries, similar to Li, Shi and Wu (2006) and Chang and Hung (2010). Utilizing monthly Treasury pricing data, Treasury bonds are sorted into on-the-run and off-the-run bonds for each month in the sample period in order to match to the issue date of the Rule 144A bonds.[15] On-the-run bonds are those bonds that have been most recently issued relative to the month. Chang and Hung (2010) apply this measure of liquidity spread in the Treasury bond market and find it as a suitable proxy for the liquidity component of corporate bonds. Therefore, I expect to see a positive effect of the Treasury proxy on liquidity premium.

In addition to the difference in on-the-run and off-the-run Treasury yields as a proxy for liquidity, my analysis uses the issue size of the bond. Fisher (1959) proposed large issues should trade more frequently and therefore, issue amount proxies for the direct liquidity measure of trading volume. This is in line with Amihud and Mendelson (1986a, 1986b, 1991) who argue that bonds with smaller issue amounts get locked into buy-and-hold portfolios and hence trade less and, in turn, are less liquid. This proxy has been found in past literature[16] to be negative and statistically significant supporting the theory that smaller issues are less liquid. Therefore, I anticipate a negative impact of amount issued on liquidity premium.

In concert with Amihud and Mendelson's buy-and-hold portfolio theory, bonds with shorter maturities are less likely to be locked into portfolios and will therefore be more liquid than longer maturity bonds. Consequently, my evaluation uses the time to maturity for the

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[15] I difference on-the-run and off-the-run bonds for one-period off-the-run and two-period off-the-run bonds. This means for one-period off-the-run, I take the difference between the on-the-run bond and the bond that was issued the prior period. For two-period off-the-run I difference the on-the-run bond with the bond that was issued two periods prior.

[16] Houweling et al. (2005), Alexander et al. (2000), Hong and Warga (2000), Jankowitsch et al. (2006), Krishnamurthy (2002) and Kempf and Uhrig-Homburg (2000)

bonds as a proxy for liquidity. Longstaff et al. (2005) use maturity as a proxy for liquidity arguing that there may be maturity clienteles for corporate bonds and therefore shorter maturity bonds should be more liquid. They find a strong positive relation between the non-default component and the time to maturity of a bond supporting the theory that shorter-maturity bond are more liquid than longer-maturity bonds. As such, I expect the liquidity premium to be lower for longer maturities.

Longstaff et al. (2005) proxy for liquidity using an indicator variable for whether or not the issuing firm is a financial institution and another indicator variable if the issuing firm is highly rated (credit rating AAA or AA). They argue that financial firms are more connected to capital markets and, as a result, financial firms should have bonds more liquid than bonds from other firms. They find the financial indicatory significant and positive in sign which is counter to their argument that financial firms enjoy bonds with higher liquidity but it confirms industry effects are accounted for in the liquidity of a bond. The relationship of the financial indicator with liquidity could be positive as supported by Longstaff et al.'s empirical results or negative in support of Longstaff's theory due to differences in the Rule 144A and registered bond markets.

Longstaff et al.'s intuition behind using an indicator for the credit rating is that there is a "flight-to-quality" or "flight-to-liquidity" associated with higher rated bonds because they are more marketable and as a result, their liquidity should be higher. Longstaff et al. (2005) find the coefficient on the rating indicator variable significant and negative supporting the "flight-to-liquidity" premium in corporate bonds. I utilize an indicator variable for each rating category. For example, BBB+, BBB and BBB- would all be in the same category and have an indicator of 1 if the bond was rated any of these three ratings categories or 0 if it was rated in another category. I also utilize an indicator variable for highly rated bond and an indicator variable for

registration rights to capture the liquidity associated with bonds having registration rights agreements.

As the dataset contains both domestic and foreign firms that place debt in the Rule 144A market, an indicator noting the country of incorporation as being U.S. or non-U.S. proxies as a liquidity measure. The intuition behind this proxy is that due to the differences in securities laws and corporate environments, bonds from foreign firms may be less desirable and U.S. bonds would exhibit a "flight-to-quality" over some foreign issued debt. In this case, there will be a negative relationship between the U.S. indicator and the liquidity premium.

An indicator for senior debt and a separate indicator for subordinate debt, signifying whether or not the security rank is senior or subordinate, are applied as liquidity proxies. A senior security is a security that has a claim prior to junior obligations and equity on a corporation's assets in the event of liquidation. A subordinate security has lowest rank for repayment. The intuition behind this indicator is that there may be a "flight-to-quality" component associated with senior ranked bonds, specifically for those bonds issued by firms in financial distress. If this theory holds, I would expect to see a negative relationship between senior payment rank and liquidity premium and a positive relationship between subordinate payment rank and liquidity premium. However, an argument can be made that senior payment rank bonds are more likely to be locked into buy-and-hold portfolios and hence trade less and, in this case, there would be a positive relationship between senior payment rank and liquidity premium. This theory would translate to a negative relationship between subordinate payment rank and liquidity premium.

Lastly, I employ an indicator specifying whether the issuing firm is listed on a U.S. stock exchange at the time of the issue or if the issuer has a parent company with stock listed on a U.S.

exchange.   Alexander et al. (2000) finds that bond issues of private firms trade more often than issues of public firms reflecting the higher liquidity of private firm bonds.   They explain this result based on the fact that the only investment vehicle for a private company is debt while public firms have both debt and equity traded and hence, private firm debt will trade more often and have a higher liquidity.   Therefore, I anticipate the liquidity premium to be higher for public firms.

I calculate the bond yields at the time of issue for 144A bonds from the information provided by Bloomberg.   Benchmark Treasuries for calculating yield spreads are obtained from the U.S. Department of the Treasury.   Cubic spline interpolation is used on the Treasury yield curve to interpolate Treasury yields for each 144A bond maturity, then this interpolated value is matched to each bond by day of issue.   The interpolated Treasury yield is differenced from the bond yield to obtain the yield spread.   The same process is used for the registered bond data, interpolating the Treasury yield curve to the maturities of each registered bond.

Treasury bond price data is obtained from CRSP.   I sort Treasury bonds into on-the-run and off-the-run for each month in the sample period in order to match to the issue date of the Rule 144A bonds.

For those bonds issued with registration rights agreements, I collect data from Bloomberg on the length of time between issuance of the 144A debt and the A/B exchange.   I use TRACE to collect the initial price of the exchanged bond when it first trades to calculate a yield for the exchanged bonds.   From this, the liquidity spread is calculated between the 144A issue and the A/B exchange.   To verify the default risk has not changed between the issue date of the 144A bond and the exchange, I also collect Moody's and S&P ratings on the exchanged bonds to

24

ensure they are the same as for the 144A issue. This liquidity spread represents the liquidity premium that is being paid on the unregistered debt.

4.1   Matched Control Sample Approach

The measurement of liquidity may be performed directly by comparing two assets that are identical except for their liquidity. I compare 144A issues to their registered counterparts to develop a dependent variable for regression analysis. The idea behind matching is to select a registered bond that resembles the Rule 144A bond such that the difference in the yield spreads of the matched group provides the liquidity premium associated with the Rule 144A market.

Specifically, for each bond issued under Rule 144A, I match by propensity score to the nearest registered bond.[17] The benefit of using the propensity score is that it matches the Rule 144A bonds and registered bonds based on a large number of bond characteristics. This matching produces the best match given the observable bond characteristics.

Using the 144A bonds as the treatment and the registered bonds as the untreated component in the matching, the propensity score for each bond is determined based on the following bond characteristics: yield spread, amount issued, the bond rating, the industry, whether the bond is senior payment rank, whether the firm issuing the bond has equity traded on a U.S. exchange, and the issue year. The nearest neighbor matching estimator is used, allowing replacement, which means a registered bond can be matched more than once to the Rule 144A bond sample. By allowing replacement I obtain a higher quality of matching.

Once the bonds are matched, I difference the yield spread of the Rule 144A bond and the yield spread of the registered bond to derive the liquidity premium associated with Rule 144A bonds used in the analysis.

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[17] STATA ado psmatch2 is used to calculate propensity scores.

4.2   Exchanged Bond Approach

Bonds issued with registration rights agreements provide a unique situation for developing a dependent variable. Within a relatively short time period (on average six months), a majority of bonds issued with registration rights agreements are exchanged for registered debt that is then free to trade on the secondary market. By using the trade price of the registered debt, a yield can be calculated for the exchanged bond. Since these registered bonds are issued for the same firm, the difference between the yields for debt issued privately under Rule 144A and the yields of the subsequently registered debt provides a liquidity spread attributable to the Rule 144A market. I use this liquidity spread as a dependent variable to evaluate the liquidity of the Rule 144A market and determine the impact to the liquidity as a result of the 2008 amendment.

In order to ensure the default risk for the bonds is still the same between the Rule 144A issue and the exchanged registered debt, I compare Moody's and S&P ratings between the two issues to verify the resulting difference between yields truly reflects liquidity and not a change in default risk between the initial 144A issue and the exchange.

4.3   Analysis

To evaluate the liquidity premium of Rule 144A bonds I use cross-sectional ordinary least squares (OLS) regression. I also perform a firm fixed effects (FE) regression to control for any firm impact on liquidity premium as there are multiple firms in my dataset that issue more than one bond in the Rule 144A market. Using liquidity premium as the dependent variable, the regression equation is given as:

$$lp_i = \alpha + \sum_n \beta_n proxy_{n,i} + time\ trend_i + \varepsilon_i$$

Where lp is the liquidity premium. The regression is analyzed using multiple liquidity proxies, where proxy includes:

- The time until the bond matures in years at issuance

- The coupon rate of the bond

- The issue size in total dollars of the bond

- An indicator for callable bonds

- A ratings indicator for S&P ratings categories

- A rating indicator for Moody's ratings categories

- The difference between S&P and Moody's rating indicators

- An indicator for senior payment rank

- An indicator for subordinate payment rank

- The two period spread between the yields of off- and on-the-run Treasuries

- An indicator if the issuing firm is a financial firm

- An indicator for bonds issued after the Rule 144 amendment

- An indicator if the firm has equity traded on a U.S. exchange

The OLS regression analysis also controls for industry effects using indicator variables for the following industries: basic materials; communications; consumer – cyclical, consumer – non-cyclical; diversified, energy; financial; industrial; technology and utilities.

I also evaluate the yield spread of Rule 144A and registered bonds using cross-sectional OLS and firm fixed effects regression. Using yield spread as the dependent variable, calculated by differencing the bond's yield to maturity with an interpolated Treasury yield, the regression equation is given as:

$$ys_i = \alpha + \sum_n \beta_n proxy_{n,i} + time\ trend_i + \varepsilon_i$$

Where proxy includes those variables listed above for the liquidity premium analysis and the industry indicators for the OLS analysis. I analyze the difference between yield spreads of Rule 144A and registered bonds. In addition, I evaluate the impact of the Rule 144 2008 amendment to determine if the cost of debt has decreased. From this regression, I can determine if there are differences in yields between registered debt and Rule 144A debt and if the cost of debt has declined for issuing firms as a result of the 2008 Rule 144A amendment.

Lastly, I test the impact of the Rule 2008 amendment on registration rights agreements with the following regression:

$$\Pr(registration\ rights) = \alpha + \sum_n \beta_n proxy_{n,i} + \varepsilon_i$$

Where proxies include those variables listed for the liquidity premium analysis including the industry indicators specified above.

5. Data and Statistics

I collect the bond information on both Rule 144A issues and registered issues from Bloomberg Professional for the period January 1, 2003 – December 31, 2011. This database includes both domestic and foreign issued debt in addition to debt issued by public and private firms. Bond characteristics from Bloomberg include: issued amount, issued date, time to maturity, senior debt, Moody's rating, S&P rating, exchange listing, country of incorporation and details on exchanged bonds.

My initial sample contains 21,850 Rule 144A and 45,825 registered bonds. From both bond sets I delete bonds with the amount issued, minimum piece, par amount and issue price

equal to one. Bloomberg has stated that bond information that is provided to them prior to issuance without final values established for these parameters is set at one and therefore, deleting these occurrences removes data with missing information. In addition, pay-in-kind bonds, flat trading bonds and bonds with prices set by auction are deleted. Bonds with missing prices, issue dates and maturity dates are also deleted. These deletions result in a final count of 17,264 144A bonds and 35,247 registered bonds.

5.1 Full Sample Summary Statistics

I present a comparison summary between the Rule 144A bonds and the registered bonds in Table 1 for the full sample of bonds of all coupon types. Table 1 indicates that the Rule 144A market has significant economic significance for firms raising capital. Over the 2003-2011 time period over $4.65 trillion was issued in the Rule 144A market.   Comparing this to the $4.67 trillion issued in the registered debt market, it is clear that the Rule 144A bond market is a major source of capital. In fact, until the 2008 financial crisis the Rule 144A market raised more capital than the registered bond market (see Table 1). However, the Rule 144A market raised fewer funds than the registered bond market during the 2008 and 2009 years with $338.64 and $404.77 billion for those years in the Rule 144A market compared to $592.24 and $605.34 billion issued in registered bonds. The Rule 144A market seemed to regain its lead again issuing $582.39 billion, passing the total dollar value of funds raised by registered bonds in 2010 at $459.52 billion.

While the total dollar value of bonds issued in the Rule 144A market is, for the most part, greater than that raised by registered bonds in my sample, there are fewer bonds issued in the Rule 144A market than the registered bond market. This means that, on average, the issue

amount is greater for Rule 144A bonds than for registered bonds and is evident from the number

of bonds issued and the average bond issue amount in Table 1.

Table 1 also identifies the percent of callable bonds in the sample, senior debt or

subordinate debt for Rule 144A and registered bonds. Prior to the financial crisis, in 2003 and

2004, the amount of callable bonds is similar between the Rule 144A and registered bond

markets. With the onset of the financial crisis, the number of callable bonds decreased for both

markets with a much larger decrease for registered bonds. This may reflect investors' demand to

lock in investments during an unstable economy. Starting with 2009, the Rule 144A market has

a much higher rate of callable bonds than the registered market. The registered bond market has

been mostly comprised of senior debt with very little subordinate debt, while the rule 144A has

increasingly been replaced by senior debt over time with a decrease in subordinate date. This

change makes the Rule 144A market closer to the senior and subordinate status of the registered

bond market by 2011.

I further provide data summaries for the Rule 144A bond market in Table 2. It is

apparent from Table 1 and Table 2 that the structure of the Rule 144A bond market has changed

over time. In 2003, U.S. firms issued 83.61% of the total number of bonds in the Rule 144A

market. This value has steadily declined to U.S firms issuing only 44.77% of the total number of

bonds by 2011 as shown in Table 2. The total dollar amount of funds raised by U.S. firms in the

Rule 144A bond market has also declined. This has been replaced with an increase in the

number of bonds and the total amount issued by foreign firms.

The change in the structure of the Rule 144A bond market is also apparent when

examining the time to maturity at issue. Table 2 shows that while the average years to maturity

has remained relatively constant at around seven years, the percentage of bonds issued each year

with maturities greater than fifteen years has declined from 14.47% in 2003 to only 5.84% in 2011. There has also been a decline in the number of short term bonds, with maturities less than two years. Bonds with a time to maturity at issue of between two to seven years and between seven and fifteen years have seen an increase from 23.13% and 26.85% in 2003 to 39.55% and 39.11% in 2011, respectively.

Table 2 also summarizes the registration rights agreements of the Rule 144A bonds. The percent of bonds issued with registration rights agreements increased after 2008 but values never exceed 30% of the bonds issued, significantly below the 97% of high-yield Rule 144A bonds subsequently registered documented by Fenn (2000). Livingston and Zhou (2002) also find significantly more bonds with registration rights than shown in Table 2 for my sample. They find approximately 40% of investment grade bonds and 98% of high-yield bonds are accompanied with registration rights agreements. As Fenn evaluates only high-yield and Livingston and Zhou break their sample down by debt rating, I further divide registration rights by S&P ratings and determine the percentage of investment grade, high-yield and not rated debt with registration rights that are ultimately exchanged. Consistent with Livingston and Zhou (2002), high-yield bonds have a significantly higher percentage of bonds with registration rights agreements than investments grade bonds. Over the sample time period, the high-yield debt is exchanged at a higher percentage than the investment grade debt, perhaps reflecting the high-yield debt firms' inability to afford the penalty fees for not exchanging the debt within the registration rights agreement timeframe. This still does not reflect the 97% of high-yield debt that is subsequently registered as reported by Fenn (2000). My highest percentage of high-yield bonds with registration rights that are subsequently registered occurs in 2004 with 67.61% of the bonds with registration rights agreements subsequently registered. This difference in value could

reflect a change in the structure of the Rule 144A market over time as Fenn is using data from 1993 – 1998 or could reflect Fenn excluding foreign and financial issues.

The differences in coupon types between the Rule 144A and registered bond market are summarized in Table 3. From this table, it can be seen that the Rule 144A market is issuing fewer floating rate bonds and more fixed rate bonds over time. In contrast, the registered bond market is issuing fewer fixed rate and floating rate bonds and more zero coupon and variable rate bonds.

Increasing foreign investment in the United States is one reason provided by the SEC for initially issuing Rule 144A. Therefore, I compare the issuer home countries for bonds issued in both markets. A summary of these values is presented in Table 4. Over the entire sample, the proportion of issuers from the United States is relatively the same between the Rule 144A market and the registered bond market, with U.S. firms issuing 71.47% of the bonds in the Rule 144A market and 71.04% of the bonds in the registered bond market. The main difference between the composition of countries issuing in the two markets is that approximately 99% of the issuances in the registered bond market are from eight countries including the United States. In contrast, approximately 94% of the issuances in the Rule 144A market are from thirteen countries. There are thirty-three countries comprising the 99% of issuance found by only eight countries in the registered bond market.

Evaluating the data distribution by year, both the Rule 144A bond and the registered bond markets have experienced a decline in the percentage of issuers whose home country is the United States. The Rule 144A market exhibits a steadier decline of U.S. firms reflecting a noticeable impact from the financial crisis with a significant drop of U.S. firm participation from 72.33% in 2008 to 56.16% in 2009. The registered bond market has a steeper decline starting

97% of the firms from the U.S. in 2003 to approximately 56% by 2011. The registered bond

market displays an increase from 59% in 2008 to 77% in 2009 only to be followed by a

subsequent fall to 41% in 2010.

Differences in the Rule 144A and registered bond markets are also apparent when

reviewing bond ratings. Table 5 provides the percentage of investment grade and high-yield

bonds rated by Moody's and S&P. Panel A contains the Moody's ratings and Panel B contains

the S&P ratings. For bonds rated by Moody's, investment grade bonds are those bonds rated Baa

or higher and high-yield bonds are rated less than Baa. Investment grade bonds rated by S&P are

BBB- and higher. Also included in the table is the percent of bonds that are not rated by

Moody's and S&P. As seen in Table 5, the registered bond market has a higher percentage of

investment grade bonds but has shown a steady decline since 2003. There is also a substantial

increase in the percentage of registered bonds that are not rated by Moody's across the sample

period. The Rule 144A market saw a small uptick in investment grade bonds in 2005 and 2006

with a significant drop in 2008. High yield bonds showed a decrease in the 2006 – 2008 time

period but this turned around in 2009. For 2009 – 2011 the percentage of investment grade and

high-yield bonds in my sample are similar. Approximately a third of the bonds over the time

period are not rated by Moody's. This value saw a dramatic increase to 63% in 2008 but reverts

to approximately a third with the 2009 period. The S&P ratings follow a similar trend for

registered bonds with a substantial decline in investment grade bonds and an increase in bonds

that are not rated by S&P. The Rule 144A market also shows a comparable trend for S&P

ratings as with Moody's ratings.

Figure 1 and Figure 2 provide a breakdown of participation in the markets by industry.

As seen in these figures, both markets are dominated by the financial industry issuing bonds.

The registered bond market has 85.91% of the participants from the financial sector while the Rule 144A has only 68.06%. Further breaking down the participation by the financial sector, Figure 3 and Figure 4 provide the subsectors of the financial industry for the Rule 144A and registered bond markets, respectively. The financial sector participates in the Rule 144A market is primarily comprised of diversified financial services with 60.06% of the subsector, followed by banks comprising 28.08% of the subsector. In contrast, banks comprise a majority of the registered bond subsector with 53.60% followed by diversified financial services at 34.92%.

5.2   Fixed Coupon Bond Summary Statistics

The full data sample has been limited to fixed coupon, non-convertible, bonds. These deletions result in 6,465 of fixed coupon bonds in the final sample. The same filter was applied to the registered bond sample resulting in a final bond count of 15,289 registered bonds. A total of 2,978 firms issued the 6,465 bonds in the Rule 144A market. Of this, 1,745 firms issued only one bond. The registered bond market shows a marked difference in the number of firms issuing the 15,289 bonds in the sample. Only 1,200 individual firms issued the registered bonds with 503 of these firms issuing only one bond. It is clear that the registered bond market has more repeat issuers than the Rule 144A market.

Table 6 provides the Rule 144A bond and registered bond summary statistics for the fixed coupon rate bonds. This table can be compared with Table 1 to identify differences from the full sample of all coupon type bonds to the final sample of fixed coupon bonds. Differences found in comparing the two tables include the increase in the average amount issued in the Rule 144A market over all time periods. The registered bond market fixed coupon bonds have a lower average amount issued than the full sample up until 2007 when there is an increase that is

sustained through 2011. The Rule 144A fixed bond sample also has a higher percentage of callable and senior payment rank bonds than the full sample. The range for callable Rule 144A bonds has increased from 30%-60% for the full sample to 53%-78% for the fixed coupon sample. The senior payment rank shows the most change from 2003 – 2009 increasing from a range of 30% - 78% to 50% - 87%. While 2003 and 2004 show no measurable change for registered bonds, the follow-on years also show an increase in callable registered bonds from 17% - 45% to 51% - 65% . The senior payment rank for registered bonds does not show as much of an increase between the fixed coupon sample and the full sample as the Rule 144A bond but there is an increase between 1% - 13% per year except for 2008 which saw a 5% decline in the amount of bonds in the sample that had senior payment rank status. The subordinate payment rank for both Rule 144A and registered bonds shows a slight increase for the fixed coupon bond sample over the full sample.

Data statistics specific to the fixed coupon bond Rule 144A bond sample are presented in Table 7. Comparing Table 2 and Table 7 provides insight into the differences between the fixed bond sample and the full sample. The total percentage of bonds issued by U.S. and non-U.S. firms has stayed relatively constant but the issue size has seen a noticeable drop for both U.S. firms and non-U.S. firms. The largest difference in the two samples for U.S. firms is in the early years with around $200 million difference in the average bond issue amount. However, 2009 through 2011 reflected only a small, less than $31 million, difference between the two samples. The non-U.S. firms have around a $60 million difference per year, except for 2005 through 2008, with a much higher difference between the full bond sample and the fixed coupon bond sample, between $115 and $222 million. The average time to maturity also exhibits a slight increase in the fixed coupon bond sample with the greatest difference occurring in 2006 with a 3.49 year

difference in the averages. Limited the sample to only fixed coupon bonds has an increase on the percentage of bonds with registration rights agreements and the number of bonds with agreements that are actually exchanged.

One reason given by the SEC for issuing Rule 144A was to increase foreign investment in the United States. Therefore, I compare the final fixed coupon bond sample with the full sample. Table 8 provides the breakdown by issuer home country for the bonds issued in the fixed coupon rate sample. In comparison to Table 4, the proportion of total issuances by U.S. firms stayed relatively the same for the Rule 144A bond market; however, there was a substantial increase in U.S. firms issuing bonds in the registered bond market increasing from 70.98% to 94.05%.

Table 9 presents the Moody's and S&P ratings for the fixed coupon bond sample. Comparing Table 9 with Table 5, for both ratings the total number of bonds without ratings has decreased from the full sample. This change is mainly reflected in an increase in high-yield bonds with ratings in the Rule 144A market and an increase in investment grade bonds with ratings in the registered bond market.

Lastly, comparing industry sectors, between the full sample and the fixed coupon sample, Figure 5 and Figure 6 show a clear change in industries from the full sample. By comparing with Figure 1 and Figure 2 it is obvious there is a substantial decrease in the number of financial firms issuing fixed coupon bonds in the Rule 144A sample. Financial firms comprised of 68.03% of the firms for the full sample compared to only 36.38% in the fixed income bond sample. The registered bond sample showed a less dramatic decline in financial firms issuing bonds, decreasing from 85.92% in the full bond sample to 75.87% in the fixed-coupon bond sample.

5.2.1   Fixed Coupon Bond Sample Correlations

Table 10 provides the pairwise correlations for the Rule 144A variables. Most pairwise correlations are statistically significant at the 1% level. As expected, the correlation between coupon rate and yield spread and the correlation between liquidity premium and yield spread is strong and positive. In addition, the pairwise correlation coefficients for registered bonds are presented in Table 11. Again I find that most correlations are statistically significant at the 1% level.

5.2.2   Fixed Coupon Bond Means

Table 12 contains a summary of the variable means separated into Rule 144A and registered bonds. The first set of means provides the variable averages over the entire sample period. The second and third set of means provide the variable averages before and after the amendment to Rule 144A to determine if the variables exhibit a significant difference before and after the amendment.

It is clear from Table 12 that the market has undergone a significant change before and after the amendment. These differences are statistically significant at the 1% level for all variables in the registered bond market and all except for time-to-maturity and Moody's rating in the Rule 144A market. In particular, I observe a significant increase in the average liquidity premium of Rule 144A bonds after the Rule 144 amendment. Before the amendment, the liquidity premium averaged -79 bps which increased markedly to 1.39% after the amendment. This

Examining the first two columns of Table 12, the spread for the Rule 144A sample is approximately 2% higher than registered bonds at 3.58% and 1.52%, respectively. Summing the registered bonds' average spread of 1.52% with the average Rule 144A liquidity premium of 87 bps, an average spread of 2.40% would be the expected spread for Rule 144A bonds. This is lower than the average 3.58% spread reflected by the data most likely reflecting the additional default risk priced into the yield spreads of Rule 144A bonds over that of registered bonds.

This difference in default risk between the Rule 144A and registered bond market is evident in the comparison of means of rating indicators between the Rule 144A sample and the registered bond sample, as shown in Table 12. The indicator values correspond to equivalent ratings for the Rule 144A bonds of Ba3 for Moody's and just above BB- for S&P. This is in comparison to the registered bonds with mean indicator values equivalent to a Moody's rating of just above A3 and an S&P rating of A-. This reflects the fact that more high-yield and non-rated bonds are issued in the Rule 144A market than in the registered market.

Evaluating the bond ratings before and after the amendment, the bond rating for registered bonds decreased from an average Moody's rating of A2 to Baa3 and from an S&P rating of A to BBB-. The Rule 144A market showed no change in ratings before and after the amendment.

I observe a decline in average amount of investment grade bonds, U.S. firms issuing bonds, and financial firms issuing bonds for both markets after the amendment. Both markets also exhibit an increase in bonds with senior payment rank status after the amendment. Specifically, there is a higher average percentage of investment grade bonds in the registered bond market, 90.65%, over the Rule 144A market, 46.47%. The registered bond market also has a higher percentage of U.S. firms (94.05% v. 72.61%), a higher percentage of senior payment

rank bonds (86.61% v. 68.57%) and more financial firms (75.87% v. 36.24%) than the Rule 144A market.

Table 13 further breaks down the variable means by year for observable trends in the variable means over time. The Rule 144A liquidity premium exhibits a decrease at the start of the sample period with a substantial increase in 2008. While this value has decreased from an average 3.25% in 2008 to an average 1.66% in 2011, the Rule 144A liquidity premium is still significantly higher than the 0.69% Rule 144A liquidity premium from 2003 which was the largest liquidity premium prior to the amendment. In total, Table 13 reflects the overall change in the market composition for Rule 144A and registered bonds over the sample period.

CHAPTER 3: LIQUIDITY AND THE IMPACT OF THE 2008 RULE 144a AMENDMENT

6. REGRESSION ANALYSIS

6.1 Propensity Score Matching

I calculate by propensity score from the following equation:

$$Probit(144A = 1)$$

$$= \beta_0 + \beta_1 spread_i + \beta_2 Amt_i + \beta_3 S\&P_i + \beta_4 senior_i + \beta_5 sector_i + \beta_6 listed_i$$

$$+ \beta_7 year_i + \varepsilon_i$$

Where:

- Spread is the yield spread indicator of the bond

- Amt is the amount issued in dollars

- S&P is the S&P rating

- Senior is an indicator for bonds with senior payment rank

- Sector is an indicator for the bond's industry subsector

- Listed is an indicator if the firm issuing the bond or the parent of the firm issuing the bond has stock traded on a U.S. exchange

- Year is the year the bond was issued.

All determinates are significant in the probit regression. The summary statistics for the difference in propensity scores between the Rule 144A bond and the matched registered bond is provided in Table 14, Panel A. The average difference between the Rule 144A and matched registered bond is 0.00013 with a maximum difference of 0.00336.

I use a two-sample t-test[18] to determine if there are significant differences between the propensity scores for the Rule 144A and registered bonds. I also use a two-sample t-test to check if there are significant differences in the means of the variables used in the probit analysis. Before matching, differences are expected, but after matching, differences should not be significant between the Rule 144A bonds and their matched registered bond. A summary of the means for the matched Rule 144A and registered bonds are provided in Table 14, Panel B. The propensity score mean for the Rule 144A and registered bonds are not significantly different. In addition, the means of the spread, senior payment rank and industry subsector for the Rule 144A and matched registered bonds are not significantly different.

Due to my large sample size, small differences are likely to become significant even though the differences may be trivial. Therefore, I visually evaluate the three variables with statistically significant differences: S&P rating, listed indicator and amount issued. The mean for the S&P rating of the Rule 144A bonds is 12.73 compared to the matched registered bond means of 12.27. An S&P indicator of 12 is equivalent to an S&P rating of BB while 13 is equivalent to an S&P rating of BB-. The means of 12.73 and 12.14 are both between S&P ratings BB and BB-. These differences are not large enough to impact the quality of my match. The differences between the means of the listed indicator for Rule 144A and registered bonds is .0415 with the registered bonds having a larger value for firms that have equity trading on a U.S. exchange. This is not unexpected due to the fact that the Rule 144A market allows firms that are not already SEC reporting firms to issue bonds. The difference in means is not large enough to expect an impact to the quality of the propensity score match considering the acceptability of the other variable matches.

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[18] In a 2008 *Journal of Economic Surveys* article, Caliendo and Kopeinig provide, "Some Practical Guidance for the Implementation of Propensity Score Matching." A t-test is one of the methods discussed in this article.

The last variable, amount issued, has a much larger difference between the means of the Rule 144A bonds and their matched registered counterparts. However, there are significant differences in the amount issued between the full Rule 144A and registered bond samples as indicated in Table 14, Panel C. Due to this large difference between the samples I would expect the issued amounts to be different. However, with the propensity score means as close as they are and the insignificant differences of my other variables I still find the quality of my matching acceptable.

6.2 Regression Results

I analyze my sample using OLS regression with the liquidity premium of Rule 144A bonds as the dependent variable. In addition, I perform a firm FE regression because my sample includes firms that issue repeatedly in the Rule 144A market. Table 15 provides the results of these regressions.[19]

Column 1 provides the results of the OLS regression. As seen in Column 1, the coefficients on time-to-maturity, amount issued, and listed equity indicator are all signed as predicted and statistically significant at the 1% level. The senior and subordinate payment rank coefficients are statistically significant at the 1% level and signed consistent with the buy-and-hold portfolio theory.

Specific to the year indicators for the OLS regression in Column 1 of Table 15, the coefficients are significant at the 1% level for all years prior to the amendment. The coefficients indicate that relative to 2008 the liquidity premium prior to the amendment is 187 to 250 bps

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[19] In unreported analysis, the financial firm indicator and registration rights indicator were not statistically significant in explaining the liquidity premium and were dropped from the regression results reported.

lower. The coefficients on the year indicators are not statistically significant indicating there is

no decrease in yield premiums subsequent to the amendment.

The OLS results in Column 1 may be driven by multiple issues by individual firms;

therefore, a firm FE regression is performed. Column 2 of Table 15 presents the comparable

firm FE analysis to the OLS regression. The coefficients on time to maturity, coupon rate,

amount issued, and senior rank are comparable and of the same significance as the OLS analysis.

Differences between the OLS and FE regression include the significance of the subordinate

payment rank which is statistically significant at 5% for OLS but not significant for the FE

analysis. Except for 2007, the year indicators are the same significance but the coefficients are

slightly smaller than the OLS analysis. As with the OLS analysis, the FE regressions does not

indicate the time period after the Rule 144 amendment was statistically significant at explaining

the liquidity premium.

In order determine if the coefficients in the OLS regression are affected by multiple firms

with multiple bond issues and to determine if loss of sample is causing the change in result

between the OLS and FE analysis, I perform OLS regression on only the firms that issue one

bond over the sample period. These results are provided in Column 3 of Table 15. Isolating

away firm effects, I find the results are similar to the OLS results in coefficients and statistical

significance. This provides further evidence that the loss of sample does impact the results

obtained by FE regression and further supports that the amendment to Rule 144 did not have the

desired effect of lowering the liquidity premium.

I also evaluate the yield spreads for Rule 144A and registered bonds in order to verify the

results from the liquidity premium analysis. Table 16 provides the results of the OLS and FE

regression analysis. Comparing the OLS analyses for the Rule 144A and registered bonds the

year indicators are negative and statistically significant for Rule 144A bonds prior to the amendment but are not statistically significant after the amendment. The lack of significance on the year indicators is also present in the FE regressions. This agrees with the findings from the liquidity premium analysis and reveals that the years after the amendment are not significantly significant in explaining the increase to the yield spread after the amendment.

Inconsistencies between the Rule 144A bond coefficients and registered bond coefficients include differences in significance level and in sign. While the callable indicator is negative and statistically significant at the 1% level for the OLS and FE Rule 144A regressions the callable indicator is positive and statistically significant at the 1% level for the registered bond OLS analysis but negative and statistically significant at the 5% level for the FE regression. This indicates that investors value callable bonds in the Rule 144A market and this is reflected in lower yield spreads for callable bonds.

6.3   Probit Analysis

I use a probit analysis to determine if the probability of a bond having a registration rights agreement has declined since the 2008 amendment. This is intended to test if the reduced holding period requirement resulting from the Rule 144 amendment has changed the need for registration rights agreements for Rule 144A issuances. The results of this probit analysis are provided in Table 17. The first column includes year indicators in the probit analysis while the second column only includes an indicator for bonds issued after the amendment. Per Column 1 of Table 17, the coefficients for 2003 through 2005 are statistically significant at the 1% level. The coefficients for 2004 and 2005 are positive indicating the probability of a bond being issued with registration rights agreement are higher than the base 2008 year. Marginal effects show that

a bond issued in 2004 and 2005 improves the predicted changes of having a registration rights agreement by approximately 13%. The predicted chance of having a registration rights agreement is not statistically significant after 2005. The coefficients after the amendment are negative but are not statistically significant.

Evaluating the second column of Table 17 the coefficient on the amendment indicator is statistically significant and negative at the 1% level indicating that the predicted chance of having a registration rights agreement declines 3% after the Rule 144 amendment. This indicates that the change in holding period requirements for Rule 144A bonds slightly reduced the need for QIBs to require registration rights agreements.

6.4   Sensitivity Analysis

A sensitivity analysis was performed to evaluate the results on the liquidity premium by separating the sample in two groups based on issue date before and after the Rule 144 amendment, publicly traded firms and private firms, and firms that were U.S. firms and non-U.S. firms. I also evaluate key bond characteristics by S&P ratings classification to further understand the coefficients on the ratings categories. In addition, I provide further analysis relating to firms that issue multiple bonds in the Rule 144A market.

Table 18 summarizes the evaluation of the sample before and after the amendment. The significance and signs are the same before and after the amendment with only differences in the magnitude of the coefficients. The only exception to this is the time to maturity significance which is negative and statistically significant at the 5% level before the amendment and statistically significant at the 10% level after the amendment. This indicates that the population did not change as a result of the amendment.

Columns 1 and 2 of Table 19 provide the firm FE regression results for non-U.S. and U.S. firms. There are marked differences between the statistical significance of the coefficients for non-U.S. and U.S. firms. The coefficients on the year indicators are negative and statistically significant before the amendment only for U.S. firms. This indicates that U.S. firms had a lower liquidity premium prior to the amendment but that the liquidity premium for non-U.S. firms was not statistically different before or after the amendment.

Evaluating the results of separating the bonds issued by public firms from non-public firms, Table 19, Columns 3 and 4, reveals similar coefficients in sign, magnitude and significance for most of the explanatory variables. There are differences in significance for the year indicator coefficients. As a large number of unlisted firms are foreign firms this could reflect the finding from the non-U.S. and U.S. firm comparisons provided in Columns 1 and 2 of Table 19.

In unreported results, the coefficients on the S&P rating categories for D and not rated bonds were negative and statistically significant at the 1% level. This indicates that the liquidity premium for these bonds was less than higher rated bonds. In order to verify these values, means of key bond characteristics including yield to maturity, spread, coupon, amount issued and time to maturity were evaluated. These results are presented in Table 20. Panel A contains the means of the entire sample of Rule 144A and registered bonds. Panel B contains the entire sample of Rule 144A bonds and Panel C contains the entire sample of registered bonds. Evaluating the means for these three panels, the yield to maturity, spread and coupon all increase with decreasing S&P rating. The D rated bonds have a much lower yield to maturity than expected, on the order of BBB+ rated bonds. As seen in Panel B, these bonds are all bonds issued under Rule 144A. Further evaluation shows these are mainly multiple issues from financial firms. The

Rule 144A unrated bonds have a similar yield to maturity as BB+ bonds as do the unrated registered bonds. This explains why the coefficient on the rating category indicator is negative as these bonds have lower yield spreads and therefore lower liquidity premiums.

Panel D of Table 20 contains the means by S&P rating category for Rule 144A bonds before the amendment and Panel E provides the means after the amendment. Panel F and G provide the same for registered bonds, respectively. The yield to maturity prior to the amendment for unrated Rule 144A bonds is similar to BB+ rated bonds and after the amendment the means of the yield to maturity remain similar to BB+ bonds. The mean of the yield to maturity for the unrated bonds, on the other hand, were similar to BBB rated bonds before the amendment. After the amendment, the average yield to maturity for unrated bonds is BB, a decrease from before the amendment, and lower than the unrated bonds in the Rule 144 market.

In order to further evaluate whether firms that issue multiple bonds in the Rule 144A market impact regression results I first calculate the average number of issues per industry. Table 21 indicates that the financial industry dominates the number of repeat issues with an average of 27.66 Rule 144A issues per firm.

I also evaluate the largest repeat issuers to confirm the financial industry dominance of multiple issues in the Rule 144A market. The top twenty-three multiple issuers are all financial firms issuing a total of 866 Rule 144A bonds.

I further assess the repeat issuers by evaluating the liquidity premium by the total number of issues. Table 22 provides these results. This table reports that, for firms issuing five or fewer Rule 144A bonds, the average liquidity is positive with single issuers having over a three times larger liquidity premium than firms that issue four or five bonds. Firms that issue greater than five bonds in the Rule 144A market have a negative average liquidity premium. This signifies

that bonds from large repeat issuers have a lower yield spread than their registered counterpart, and indicates the market values information provided by repeat issuers and reveals the market learns from prior issues.

Table 23 provides the results of firm fixed effects and OLS analyses accounting for the repeat issuers. Column 1 repeats the full sample firm fixed effects regression. Column 2 provides the results of an OLS regression on only the bonds that were issued by non-repeat issuing firms. Colum 3 performs firm fixed effects regression for all firms that issue less than six bonds during the sample period and Column 4 is for the firms that issue more than five bonds. I separated the number of issues in Column 3 and 4 based on the average liquidity premiums provided in Table 22.

Comparing the four columns of Table 23, the time to maturity coefficient is negative and statistically significant for the full sample, the one bond issuer OLS and less than six bonds firm fixed effects regression. The time to maturity is not statistically significant for determining the liquidity premium when the issuing firm has more than five bonds issued during the time period. All other coefficient variables are of the same sign and significance across the four regressions. The year indicators are negative and statistically significant prior to 2008. The less than six issues analysis finds positive and significant coefficients on the year indicators after the amendment indicating that an increase in liquidity premium after the Rule 144 amendment for firms that issue less than six bonds.

6.5   Exchanged Bond Approach

As discussed in Section 4.2, differencing the yields for bonds issued under Rule 144A with their subsequently registered counterparts provides a liquidity spread attributable to the Rule 144A market. A subset of the Rule 144A sample comprised only of bonds that were exchanged is created to evaluate this liquidity spread. There are a total of 1,913 bonds that were exchanged for registered debt in this sample. Of these 1,913 bonds, only 1,341 had exchange dates or trade data available in TRACE to calculate a yield.

Table 24 provides a summary of the total exchanged bonds per year in addition to summary statistics on the number of days between issuance of the Rule 144A bond and exchange, the number of days between the issue of the Rule 144A bond and the first recorded trade in TRACE and the number of days between the exchange and the first recorded trade in TRACE. This table shows a wide difference in the number of days between issue and exchange and exchange and first trade across the bonds in the sample. Over the full sample of exchanged bonds, the average number of days from issuance of the Rule 144A bond to exchange is 197.17. The median is slightly lower at 179 and the standard deviation is large at 102.49. The minimum and maximum, at 42 and 1,060, clearly represent the large differences in the number of days from Rule 144A issuance to exchange across the sample.

To be able to use the exchanged bond yields, the time between the issue of the Rule 144A bond and the exchange has to be relatively short. This wide swing in days to exchange across the sample makes using the exchanged yield less reliable. To test this, I regress the yield spread found by differencing the yield of the exchanged bond on the day of the first trade with the yield of the Rule 144A bond on the date of issue with proxies for liquidity discussed in Section 4.3. These regression results were inconclusive and therefore are not reported. A majority of the

coefficients were not statistically significant. I determined that it was not possible to use the difference in the Rule 144A and the exchanged bond yields without further limiting the sample to control for the large variation in days between issuance and exchange. This would leave very few sample points in the data. Therefore, I conclude that the yield spread between the Rule 144A and registered bonds is not an effective means to measure the liquidity in the Rule 144A market.

7.   CONCLUSION

I present my research analyzing the liquidity component of corporate bond spreads for bonds issued privately under Rule 144A during the period 2003 – 2011. In addition, I evaluate the impact of the 2008 amendment to Rule 144 on the Rule 144A market. The information gained from this research will aid in the understanding of yield premiums paid on bonds and contribute to a distinct sector of the debt market by evaluating a market which is highly illiquid. My research differs from other bond liquidity research in that it focuses directly on private debt issued under Rule 144A, one of the most illiquid markets.

The results of my study find a statistically significant change in the liquidity premium priced into Rule 144A bonds after the SEC amended the rules governing the resale of these bonds. While the SEC anticipated a decrease in the liquidity premium, my results show an increase in liquidity premium after the amendment documenting the Rule 144 amendment did not act as intended.

I also evaluate the yield spread of the Rule 144A bonds to determine if the spreads of the Rule 144A bonds were different than the spreads of the registered bonds. As expected, the estimated yield spreads of the Rule 144A bonds are on average 2% higher than the registered

bonds. The yield spreads of Rule 144A bonds also reflect the increase in liquidity found after the Rule 144 amendment.

I further evaluate the impact of registration rights on Rule 144A to determine if the probability of a bond having a registration rights agreement has declined since the amendment. With a decrease in holding periods as a result of the amendment, QIBs may no longer require registration rights agreements from the issuers. My evidence supports this and reflects a decrease in registration rights agreements after the amendment.

Future research includes further evaluating foreign investment in the Rule 144A market. As foreign investment has overtaken domestic investment and represents over half of the capital raised in the Rule 144A market further insight into the international firms and the impact of the differences among these firms on bond yield spreads will add to the overall understanding of bond pricing. In addition, analyzing the subsequent trading of restricted bonds will provide insight on the value investors place on public information and registration. By comparing the yield spreads of Rule 144A bonds after they are free to trade with the public with equivalent unrestricted bonds it can be determined if Rule 144A bonds trade at a discount to non-restricted bonds indicating investors value the information and registration that accompanies unrestricted bonds.

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Appendices

Appendix A: Tables

Table 1: Full Sample Rule 144A and Registered Bond Summary Statistics

This table reports the summary statistics for comparison of bonds issued under Rule 144A and those registered with the SEC in my sample. The data is for all coupon types without missing data in the original dataset. Data is sorted by year. There is a total of 17,264 Rule 144A bonds in the sample and 35,247 registered bonds. Callable represents the percentage of bonds that are callable. Senior indicates the percentage of bonds that had senior payment rank while subordinate represents the percentage of debt that had subordinate payment rank.

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total Amount Issued ($ billion)									
144A	$472.24	$480.81	$479.14	$698.54	$672.42	$338.64	$404.77	$582.39	$512.74
Registered	$398.10	$443.41	$374.87	$557.02	$662.31	$592.24	$605.34	$459.52	$571.08
Total Number of Bonds Issued									
144A	2,343	2,455	2,416	2,956	2,752	1,113	828	1,253	1,148
Registered	3,172	3,470	3,323	3,2091	5,927	5,569	1,625	4,966	3,986
Average Amount of Issues ($ million)									
144A	$201.55	$195.85	$198.32	$236.31	$244.34	$304.26	$488.86	$464.80	$446.64
Registered	$125.50	$127.78	$112.81	$173.58	$111.74	$106.35	$372.52	$92.53	$143.27
Callable									
144A	45.33%	45.34%	36.75%	30.82%	33.10%	33.42%	60.87%	57.86%	51.48%
Registered	41.27%	40.66%	41.47%	41.07%	25.97%	17.38%	45.48%	24.81%	34.09%
Senior									
144A	35.81%	39.31%	31.66%	29.63%	37.28%	59.12%	78.02%	81.88%	82.75%
Registered	79.79%	84.61%	80.05%	76.29%	75.40%	89.14%	89.60%	94.28%	96.49%
Subordinate									
144A	13.19%	11.77%	8.65%	6.50%	6.00%	5.12%	6.64%	4.47%	2.87%
Registered	5.45%	7.35%	7.31%	7.01%	3.88%	2.03%	3.82%	0.32%	0.20%

Table 2: Full Sample Rule 144A Data Statistics
This table provides Rule 144A data statistics. The data is for all coupon types without missing data in the original dataset. Maturity provides the average maturity of bonds in years for each calendar year in the sample. The bonds are then grouped by maturity and the total percent of the sample per year is provided for each maturity group. Listed stock includes the percentage of bonds for each calendar year that are issued by firms with publicly traded stock. Registration rights lists the percentage of all bonds in the sample that had registration rights agreements, and % agreement exchanged is the percent of bonds with registration rights agreements that are actually exchanged. The table further breaks down registration rights by S&P rating of the bond and then provides the percent of bonds with registration rights that are actually exchanged broken down by S&P Rating.

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Domestic Issuer									
U.S. (% total number issued)	83.61%	81.63%	78.19%	71.38%	71.26%	72.33%	56.16%	50.36%	44.77%
Non-U.S. (% total number issued)	16.39%	18.37%	21.81%	28.62%	28.74%	27.67%	43.84%	49.64%	55.23%
U.S. (issue size, $ billions)	$357.98	$366.00	$314.02	$402.98	$414.10	$170.14	$211.24	$277.64	$219.98
Non-U.S.(issue size, $ billions)	$114.26	$114.81	$165.12	$295.56	$258.32	$168.50	$193.53	$304.75	$292.76
Maturity									
Average (years)	7.74	7.59	7.65	6.62	6.85	5.36	7.56	7.35	7.08
>15 years	14.47%	13.32%	13.25%	11.30%	12.46%	7.19%	8.70%	5.90%	5.84%
>7 – 15 years	26.85%	26.88%	21.11%	18.37%	20.93%	17.25%	32.49%	42.14%	39.11%
>2 – 7 years	23.13%	25.13%	24.00%	27.60%	22.46%	21.83%	39.85%	38.79%	39.55%
< 2 years	35.55%	34.67%	41.64%	42.73%	44.15%	53.73%	18.96%	13.17%	15.50%
Registration Rights									
Agreement	13.06%	23.01%	16.85%	12.65%	12.94%	11.77%	29.47%	28.73%	25.35%
% Agreement Exchanged	66.34%	67.61%	66.58%	48.93%	50.00%	52.67%	64.34%	60.83%	44.67%
Registration Rights by S&P Rating									
Inv. Grade	18.63%	16.11%	21.13%	23.80%	20.22%	33.59%	22.54%	16.95%	14.78%
High Yield	78.76%	76.81%	68.30%	61.76%	55.90%	51.91%	74.59%	79.72%	80.41%
Not Ranked	2.61%	7.08%	10.57%	14.44%	23.88%	14.50%	2.87%	3.33%	4.81%
% Exchanged per S&P Rating									
Inv. Grade	49.12%	61.54%	60.47%	33.71%	61.11%	43.18%	56.36%	36.07%	13.95%
High Yield	72.61%	74.19%	76.26%	64.94%	65.83%	70.59%	68.68%	66.90%	50.43%
Not Ranked	0.00%	10.00%	16.28%	5.56%	3.53%	10.53%	14.29%	41.67%	42.86%

Table 3: Full Sample Rule 144A and Registered Bond Coupon Types
This table presents a comparison the coupon type for the bonds in the Rule 144A and registered bond samples. The data is for all coupon types without missing data in the original dataset. Note that Bloomberg overwrites the coupon type when payment on a bond is in default or when the bond has been exchanged. In these cases, the coupon type is changed to reflect the default or exchange action. Data is organized by year.

		2003	2004	2005	2006	2007	2008	2009	2010	2011
DEFAULTED										
	144A	1.54%	2.00%	1.86%	4.50%	9.85%	2.52%	0.97%	0.48%	0.26%
	Registered	3.37%	3.31%	3.58%	3.55%	5.13%	4.44%	0.12%	0.02%	0.03%
EXCHANGED										
	144A	18.14%	19.51%	13.04%	6.66%	7.41%	7.28%	19.69%	18.28%	11.50%
	Registered	0.22%	0.17%	0.09%	0.09%	0.10%	0.02%	5.66%	2.26%	0.28%
FIXED										
	144A	30.04%	26.43%	22.56%	22.10%	27.18%	43.38%	53.25%	55.46%	60.54%
	Registered	77.69%	72.37%	72.56%	63.23%	66.86%	61.48%	60.80%	57.83%	47.31%
FLOATING										
	144A	42.64%	44.93%	54.30%	58.15%	45.35%	31.36%	19.57%	16.68%	12.98%
	Registered	11.79%	11.99%	10.98%	14.12%	5.52%	4.11%	5.17%	2.05%	4.14%
STEP CPN										
	144A	0.68%	0.77%	0.58%	0.61%	0.47%	0.72%	0.24%	0.72%	0.35%
	Registered	3.34%	4.41%	2.65%	0.31%	0.13%	0.32%	0.37%	4.49%	6.65%
VARIABLE										
	144A	4.57%	4.24%	4.14%	4.97%	6.29%	7.28%	4.47%	6.07%	7.58%
	Registered	1.51%	5.36%	6.47%	6.64%	3.26%	4.26%	7.02%	8.16%	10.91%
ZERO COUPON										
	144A	2.39%	2.12%	3.52%	3.01%	3.45%	7.46%	1.81%	2.31%	6.79%
	Registered	2.08%	2.39%	3.67%	12.06%	19.00%	25.37%	20.86%	25.19%	30.68%

Table 4: Full Sample Rule 144A and Registered Bond Issuer Home Countries

This table summarizes the issuing home countries for Rule 144A and registered bonds. The data is for all coupon types without missing data in the original dataset.

Panel A: This panel provides the proportion of home countries in both the Rule 144A and registered bond markets.

Rule 144A		Registered	
Issuer Home Country	**Proportion of Issuances**	**Issuer Home Country**	**Proportion of Issuance**
United States	71.47%	United States	71.04%
Cayman Islands	6.12%	Britain	13.76%
Britain	4.16%	Netherlands	4.05%
Australia	2.37%	Canada	3.13%
Netherlands	1.76%	Germany	2.88%
Canada	1.58%	Switzerland	1.95%
Ireland	1.11%	Norway	1.36%
Germany	1.08%	Sweden	0.79%
Luxembourg	0.92%	Other	1.04%
France	0.91%		
Bermuda	0.89%		
Switzerland	0.82%		
Brazil	0.75%		
OTHER (59 Countries)	6.06%		

Panel B: This panel provides a breakdown of U.S. firm participation in the Rule 144A and registered bond markets by year.

	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**Total Sample**
U.S. 144A	83.61%	81.63%	78.19%	71.38%	71.26%	72.33%	56.16%	50.36%	44.77%	71.47%
U.S. Registered	97.01%	94.64%	90.46%	88.72%	68.26%	59.24%	76.68%	40.50%	55.82%	71.04%

Table 5: Full Sample Rule 144A and Registered Bond Ratings
This table provides a summary of bond ratings for Rule 144A and registered bonds. The data is for all coupon types without missing data in the original dataset. Panel A contains the data summary for Moody's bond ratings and Panel B contains the data summary for S&P bond ratings.

Panel A: This panel provides a summary of Rule 144A and registered bonds' Moody's ratings based on the bonds being classified as investment grade ($\geq$Baa3), high-yield (less than Baa3) or is not rated by Moody's.

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Investment Grade									
Rule 144A	34.87%	38.74%	56.46%	52.84%	43.79%	27.31%	34.54%	34.40%	31.88%
Registered	93.22%	92.16%	91.60%	89.65%	63.30%	48.00%	51.32%	26.80%	41.77%
High-Yield									
Rule 144A	22.24%	22.04%	16.18%	12.38%	14.43%	9.97%	31.52%	39.51%	34.67%
Registered	1.99%	2.33%	1.38%	2.46%	1.01%	0.48%	8.86%	3.20%	2.33%
Not Rated									
Rule 144A	42.89%	39.22%	27.36%	34.78%	41.78%	62.72%	33.94%	26.09%	33.45%
Registered	4.79%	5.51%	7.02%	7.89%	35.69%	51.52%	39.82%	70.00%	55.90%

Panel B: This panel provides a summary of Rule 144A and registered bonds' S&P ratings based on the bonds being classified as investment grade ($\geq$BBB-), high-yield (less than BBB-) or is not rated by S&P.

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Investment Grade									
Rule 144A	58.34%	50.63%	60.64%	58.12%	46.69%	33.69%	34.66%	33.04%	29.79%
Registered	96.56%	94.50%	89.29%	82.42%	46.48%	29.38%	48.43%	24.37%	44.36%
High-Yield									
Rule 144A	23.64%	24.77%	17.18%	14.58%	18.17%	10.69%	35.51%	39.98%	36.06%
Registered	1.77%	2.13%	1.29%	2.56%	1.21%	0.63%	8.49%	3.08%	2.18%
Not Rated									
Rule 144A	18.02%	24.60%	22.18%	27.30%	35.14%	55.62%	29.83%	26.98%	34.15%
Registered	1.67%	3.37%	9.42%	15.02%	52.31%	69.99%	43.08%	72.55%	53.46%

Table 6: Fixed Coupon Rule 144A and Registered Bond Summary Statistics

This table reports the summary statistics for comparison of bonds issued under Rule 144A and those registered with the SEC in my sample. The data is only for fixed coupon bonds without missing data. Table 1 provides a comparison table that includes all coupon types in the original sample without missing data. Data is sorted by year. There is a total of 6,465 Rule 144A bonds in the sample and 15,289 registered bonds. Callable represents the percentage of bonds that are callable. Senior indicates the percentage of bonds that had senior payment rank while subordinate represents the percentage of debt that had subordinate payment rank.

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total Amount Issued ($ billion)									
144A	$249.87	$219.96	$170.05	$218.40	$263.66	$142.67	$327.15	$495.70	$415.88
Registered	$234.87	$196.06	$153.61	$229.79	$329.95	$374.12	$462.07	$353.30	$426.48
Total Number of Bonds Issued									
144A	910	864	681	725	840	303	554	862	726
Registered	2413	2349	2154	1677	1825	1284	895	1208	1484
Average Amount of Issues ($ million)									
144A	$273.69	$254.58	$248.98	$297.15	$312.02	$467.77	$590.52	$575.06	$572.84
Registered	$97.33	$83.47	$71.31	$137.03	$180.79	$291.37	$516.27	$292.47	$287.19
Callable									
144A	68.02%	67.13%	68.37%	63.27%	53.96%	70.82%	78.16%	75.52%	74.66%
Registered	42.64%	44.10%	51.49%	65.06%	63.84%	52.34%	61.12%	61.42%	60.07%
Senior									
144A	61.77%	58.68%	63.54%	54.56%	50.65%	81.31%	87.00%	86.31%	87.19%
Registered	86.66%	89.83%	86.68%	87.48%	88.16%	84.58%	95.31%	96.61%	97.71%
Subordinate									
144A	16.21%	16.90%	12.74%	8.30%	6.63%	7.87%	5.78%	4.99%	2.34%
Registered	6.71%	10.13%	10.40%	11.69%	9.92%	7.71%	1.90%	1.16%	0.40%

Table 7: Fixed Coupon Sample Rule 144A Data Statistics
This table provides Rule 144A data statistics. The data is only for fixed coupon bonds without missing data. Table 2 provides a comparison table that includes all coupon types in the original sample without missing data. Maturity provides the average maturity of bonds in years for each calendar year in the sample. The bonds are then grouped by maturity and the total percent of the sample per year is provided for each maturity group. Listed stock includes the percentage of bonds for each calendar year that are issued by firms with publicly traded stock. Registration rights lists the percentage of all bonds in the sample that had registration rights agreements, and % agreement exchanged is the percent of bonds with registration rights agreements that are actually exchanged. The table further breaks down registration rights by S&P rating of the bond and then provides the percent of bonds with registration rights that are actually exchanged broken down by S&P Rating.

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Domestic Issuer									
U.S. (% total number issued)	83.46%	79.75%	76.13%	75.24%	77.28%	72.13%	67.87%	62.18%	55.51%
Non-U.S. (% total number issued)	16.54%	20.25%	23.87%	24.76%	22.72%	27.87%	32.13%	37.82%	44.49%
U.S. (issue size, $ billions)	$185.03	$160.81	$120.77	$145.08	$176.27	$90.10	$188.61	$254.11	$190.17
Non-U.S.(issue size, $ billions)	$64.84	$59.14	$49.29	$73.32	$87.38	$52.57	$138.54	$241.58	$225.71
Maturity									
Average (years)	9.46	9.90	9.77	10.11	9.72	8.70	8.14	8.28	8.49
>15 years	8.32%	8.45%	11.57%	9.52%	10.06%	7.87%	8.30%	5.80%	5.92%
>7 – 15 years	56.19%	57.06%	51.24%	44.76%	38.82%	48.85%	46.39%	56.03%	57.85%
>2 – 7 years	23.66%	24.54%	25.77%	24.76%	18.82%	38.03%	42.60%	36.54%	35.12%
< 2 years	11.83%	9.95%	11.42%	20.95%	32.31%	5.25%	2.71%	1.62%	1.10%
Registration Rights									
Agreement	28.15%	46.18%	41.14%	29.52%	24.14%	33.11%	42.78%	40.49%	39.26%
% Agreement Exchanged	71.98%	78.20%	77.58%	71.89%	75.49%	61.39%	66.24%	62.18%	43.86%
Registration Rights by S&P Rating									
Inv. Grade	16.73%	20.80%	24.91%	21.20%	24.51%	37.62%	22.36%	17.19%	15.09%
High Yield	82.10%	78.95%	72.60%	76.96%	72.06%	58.42%	75.95%	80.52%	80.70%
Not Ranked	1.17%	0.25%	2.49%	1.84%	3.43%	3.96%	1.69%	2.29%	4.21%
% Exchanged per S&P Rating									
Inv. Grade	58.14%	65.06%	62.86%	52.17%	76.00%	44.74%	58.49%	35.00%	13.95%
High Yield	75.83%	81.59%	82.84%	77.25%	77.55%	74.58%	69.44%	67.97%	50.00%
Not Ranked	0.00%	100.00%	71.43%	75.00%	28.57%	25.00%	25.00%	62.50%	33.33%

Table 8: Fixed Coupon Rule 144A and Registered Bond Issuer Home Countries
This table summarizes the issuing home countries for Rule 144A and registered bonds. Table 4 provides a comparison table that includes all coupon types in the original sample without missing data. The data is only for fixed coupon bonds without missing data.

Panel A: This panel provides the proportion of home countries in both the Rule 144A and registered bond markets.

Rule 144A		Registered	
Issuer Home Country	**Proportion of Issuances**	**Issuer Home Country**	**Proportion of Issuance**
United States	72.64%	United States	94.05%
Cayman Islands	3.30%	Britain	3.85%
Canada	2.99%	Canada	0.33%
Britain	2.27%	Australia	0.22%
Netherlands	2.03%	Switzerland	0.20%
Luxembourg	1.74%	Netherlands	0.17%
Australia	1.65%	Cayman Islands	0.16%
Brazil	1.36%	France	0.14%
Mexico	1.34%	Other	0.88%
South Korea	0.96%		
France	0.86%		
Bermuda	0.79%		
Ireland	0.62%		
Chile	0.57%		
Argentina	0.54%		
British Virgin	0.51%		
Other	5.84%		

Panel B: This panel provides a breakdown of U.S. firm participation in the Rule 144A and registered bond markets by year.

	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
U.S. 144A	83.46%	79.75%	76.13%	75.24%	77.28%	72.13%	67.87%	62.18%	55.51%
U.S. Registered	99.05%	99.23%	99.16%	97.97%	97.81%	96.88%	93.30%	78.56%	71.85%

Table 9: Full Sample Rule 144A and Registered Bond Ratings

This table provides a summary of bond ratings for Rule 144A and registered bonds. The data is only for fixed coupon bonds without missing data. Table 5 provides a comparison table that includes all coupon types in the original sample without missing data. Panel A contains the data summary for Moody's bond ratings and Panel B contains the data summary for S&P bond ratings.

Panel A: This panel provides a summary of Rule 144A and registered bonds' Moody's ratings based on the bonds being classified as investment grade (≥Baa3), high-yield (less than Baa3) or is not rated by Moody's.

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Investment Grade									
Rule 144A	35.38%	30.44%	39.39%	44.63%	35.86%	39.02%	38.09%	33.76%	35.67%
Registered	93.45%	94.21%	94.48%	93.50%	93.59%	82.55%	72.40%	67.47%	71.99%
High-Yield									
Rule 144A	45.67%	44.44%	42.17%	36.60%	36.69%	29.51%	46.75%	55.57%	53.31%
Registered	1.86%	2.04%	1.49%	3.04%	2.36%	1.64%	15.20%	12.83%	6.06%
Not Rated									
Rule 144A	18.95%	25.12%	18.45%	18.78%	27.46%	31.48%	15.16%	10.67%	11.02%
Registered	4.68%	3.75%	4.04%	3.46%	4.05%	15.81%	12.40%	19.70%	21.95%

Panel B: This panel provides a summary of Rule 144A and registered bonds' S&P ratings based on the bonds being classified as investment grade (≥BBB-), high-yield (less than BBB-) or is not rated by S&P.

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Investment Grade									
Rule 144A	43.59%	33.91%	41.29%	44.08%	37.16%	43.28%	38.81%	32.02%	32.09%
Registered	98.01%	97.57%	95.26%	92.73%	90.63%	83.33%	74.19%	68.13%	72.73%
High-Yield									
Rule 144A	44.14%	46.76%	43.05%	39.73%	42.96%	30.16%	46.75%	53.02%	51.93%
Registered	1.53%	1.70%	1.21%	2.86%	1.92%	1.64%	13.97%	12.50%	5.59%
Not Rated									
Rule 144A	12.27%	19.33%	15.67%	16.19%	19.88%	26.56%	14.44%	14.97%	15.98%
Registered	0.46%	0.72%	3.53%	4.41%	7.45%	15.03%	11.84%	19.37%	21.68%

Table 10: Correlations for Rule 144A Sample

This table presents the pairwise correlations for the Rule 144A variables used in analysis. Liquidity is the difference in yield spreads between the Rule 144A and matched registered bond; Yield Spread is the spread between the 144A bond yield to maturity and the interpolated Treasury yield; Yield-to-Maturity is the yield of the fixed coupon bond if held to maturity; Yrs to Maturity is the time to maturity at issuance; Coupon is the coupon rate of the bond; Amount Issued is the total amount issued in U.S. dollars; Moody's rating is an indicator assigned corresponding to the bond's Moody's rating with Aaa = 1, increasing in value as the rating decreases with Not Rated = 23; S&P Rating is an indicator assigned corresponding to the bond's S&P rating with AAA = 1, increasing in value as the rating decreases with Not Rated = 23; MoodyS&P Rating is the indicator variable corresponding to each unique Moody's and S&P pair; Rating difference is the difference between the S&P and Moody's ratings; Investment grade is an indicator for Moody's≥Baa3 and S&P≥BBB- ; Amendment is 0 for before February 15, 2008 and 1 after; U.S. is 1 if the firm is headquartered in the United States; Senior is 1 if the bond has senior payment rank; Subordinate is 1 if the bond has subordinate payment rank; Financial is 1 if the bond was issued by a financial firm; High rate is 1 if Moody's≥ Aa3 or S&P≥AA-; Reg rights is 1 if the bond has a registration rights agreement; Treas Proxy1 is the Treasury proxy for one-period off the run and on the run differences; and, Treas Proxy2 is the Treasury proxy for two period off the run and on the run differences. The sample period is from January 1, 2003 to December 31, 2011.

	Liquidity Premium	Yield Spread	Yield-to-Maturity	Yrs to Maturity	Coupon	Amount Issued	Moody's Rating	S&P Rating	Moody S&P	Rating difference
Liquidity Premium	1.0000									
Yield Spread	0.7060*	1.0000								
Yield-to-Maturity	0.6438*	0.9302*	1.0000							
Yrs to Maturity	-0.0567*	-0.0706*	0.0547*	1.0000						
Coupon	0.5091*	0.7956*	0.8856*	0.0970*	1.0000					
Amount Issued	0.0231	0.0215	-0.0461*	0.0880*	-0.0639*	1.0000				
Moody's Rating	0.2020*	0.3646*	0.3635*	-0.0562*	0.3776*	-0.2646*	1.0000			
S&P Rating	0.1407*	0.3735*	0.3958*	-0.0267	0.4202*	-0.1599*	0.5469*	1.0000		
MoodyS&P	0.1459*	0.3800*	0.4017*	-0.0285	0.4262*	-0.1672*	0.5759*	0.9994*	1.0000	
Rating difference	-0.0616*	0.0155	0.0402*	0.0303	0.0514*	0.1066*	-0.4632*	0.4886*	0.4578*	1.0000
Investment grade	-0.2695*	-0.5372*	-0.5534*	0.1120*	-0.6097*	0.1689*	-0.6430*	-0.6844*	-0.6952*	-0.0544*
Amendment	0.2446*	0.3439*	0.1187*	0.0122	0.0947*	0.3213*	-0.0165	0.0421*	0.0405*	0.0618*
U.S.	-0.0364*	-0.0042	0.0404*	-0.0008	0.0384*	-0.2469*	0.1377*	0.0471*	0.0518*	-0.0937*
Senior	0.1796*	0.3285*	0.2960*	0.1414*	0.3409*	0.2452*	0.0372*	0.0962*	0.0955*	0.0631*
Subordinate	0.0364*	0.0900*	0.1433*	0.1059*	0.1719*	-0.0548*	0.1016*	0.1322*	0.1334*	0.0340*
Financial	-0.2056*	-0.3744*	-0.3864*	-0.2367*	-0.4465*	-0.1146*	-0.1781*	-0.1958*	-0.1986*	-0.0217
High Rate	-0.2091*	-0.4147*	-0.4309*	-0.2183*	-0.4736*	-0.0095	-0.4591*	-0.5732*	-0.5789*	-0.1283*
Reg Rights	0.0814*	0.2460*	0.2657*	0.0926*	0.3118*	0.1194*	0.0886*	0.0867*	0.0883*	-0.0006
Treas Proxy1	0.0826*	0.1100*	0.0885*	-0.0210	0.0854*	0.0541*	-0.0286	0.0184	0.0168	0.0493*
Treas Proxy2	0.1243*	0.1531*	-0.0029	-0.1776*	-0.0234	0.0528*	0.0024	-0.0095	-0.0092	-0.0126

Table 10 (cont.)

	Investment grade	Amendment	U.S.	Senior	Subordinate	Financial	High Rate	Reg Rights	Treas Proxy1	Treas Proxy2
Investment grade	1.0000									
Amendment	-0.0381*	1.0000								
U.S.	-0.1531*	-0.1756*	1.0000							
Senior	-0.2471*	0.2944*	-0.1424*	1.0000						
Subordinate	-0.1879*	-0.1258*	0.0841*	0.0404*	1.0000					
Financial	0.3331*	-0.1623*	-0.0521*	-0.5008*	-0.0746*	1.0000				
High Rate	0.5046*	-0.1494*	-0.0077	-0.3724*	-0.1172*	0.5575*	1.0000			
Reg Rights	-0.2869*	0.0627*	0.2702*	0.3408*	0.1573*	-0.4418*	-0.3243*	1.0000		
Treas Proxy1	-0.0336*	0.1311*	-0.0248	0.0728*	0.0094	-0.0673*	-0.0695*	0.0229	1.0000	
Treas Proxy2	-0.0316	0.2278*	-0.014	0.0433*	-0.016	-0.0420*	-0.0381*	-0.0255	0.3788*	1.0000

* p<.01

Table 11: Correlations for Registered Bond Sample

This table presents the pairwise correlations for the registered bond variables used in analysis. Yield Spread is the spread between the 144A bond yield to maturity and the interpolated Treasury yield; Yield-to-Maturity is the yield of the fixed coupon bond if held to maturity; Yrs to Maturity is the time to maturity at issuance; Coupon is the coupon rate of the bond; Amount Issued is the total amount issued in U.S. dollars; Moody's rating is an indicator assigned corresponding to the bond's Moody's rating with Aaa = 1, increasing in value as the rating decreases with Not Rated = 23; S&P Rating is an indicator assigned corresponding to the bond's S&P rating with AAA = 1, increasing in value as the rating decreases with Not Rated = 23; MoodyS&P Rating is the indicator variable corresponding to each unique Moody's and S&P pair; Rating difference is the difference between the S&P and Moody's ratings; Investment grade is an indicator for Moody's≥Baa3 and S&P≥BBB- ; Amendment is 0 for before February 15, 2008 and 1 after; U.S. is 1 if the firm is headquartered in the United States; Senior is 1 if the bond has senior payment rank; Subordinate is 1 if the bond has subordinate payment rank; Financial is 1 if the bond was issued by a financial firm; High rate is 1 if Moody's≥ Aa3 or S&P≥AA-; Treas Proxy1 is the Treasury proxy for one-period off the run and on the run differences; and, Treas Proxy2 is the Treasury proxy for two period off the run and on the run differences. The sample period is from January 1, 2003 to December 31, 2011

	Yield-to-Maturity	Yield Spread	Yrs to Maturity	Coupon	Amount Issued	Moody's Rating	S&P Rating	Moody S&P
Yield-to-Maturity	1.0000							
Yield Spread	0.7877*	1.0000						
Yrs to Maturity	0.2047*	-0.1523*	1.0000					
Coupon	0.9898*	0.7732*	0.2106*	1.0000				
Amount Issued	0.0445*	0.0974*	0.0343*	0.0367*	1.0000			
Moody's Rating	0.3454*	0.5734*	-0.2798*	0.3434*	-0.0443*	1.0000		
S&P Rating	0.3962*	0.5948*	-0.2380*	0.3954*	-0.0223*	0.8226*	1.0000	
MoodyS&P	0.3969*	0.5983*	-0.2416*	0.3961*	-0.0234*	0.8363*	0.9997*	1.0000
Rating difference	0.0653*	0.0045	0.0839*	0.0674*	0.0387*	-0.3463*	0.2486*	0.2247*
Investment grade	-0.4449*	-0.6324*	0.2560*	-0.4403*	0.0235*	-0.7762*	-0.8072*	-0.8118*
Amendment	0.1505*	0.5271*	-0.1202*	0.1421*	0.2240*	0.3089*	0.3325*	0.3339*
U.S.	0.0266*	-0.1099*	0.0254*	0.0346*	-0.0915*	-0.0173	-0.0511*	-0.0500*
Senior	0.0172	0.0543*	-0.0204	0.0140	0.0379*	-0.1333*	-0.1702*	-0.1699*
Subordinate	0.1061*	-0.0500*	0.3253*	0.1104*	-0.0549*	-0.1034*	-0.0086	-0.0127
Financial	-0.1233*	-0.1557*	-0.0912*	-0.1156*	-0.2994*	-0.1405*	-0.1256*	-0.1271*
High rate	-0.1792*	-0.2662*	0.0650*	-0.1770*	-0.0330*	-0.4962*	-0.4821*	-0.4863*

	Rating difference	Investment grade	Amendment	U.S.	Senior	Subordinate	Financial	High rate
Rating difference	1.0000							
Investment grade	-0.0096	1.0000						
Amendment	0.0224*	-0.3228*	1.0000					
U.S.	-0.0548*	0.0521*	-0.2950*	1.0000				
Senior	-0.0537*	0.1158*	0.0908*	-0.0612*	1.0000			
Subordinate	0.1620*	0.0354*	-0.1207*	0.0608*	-0.3593*	1.0000		
Financial	0.0322*	0.0325*	-0.2213*	-0.0036	-0.0388*	0.1208*	1.0000	
High rate	0.0499*	0.2415*	-0.1534*	-0.1349*	-0.0438*	0.0853*	0.2827*	1.0000

* p<.01

Table 12: Means of Variables

This table provides a summary of the means of variables used in the regression analysis. The first column summarizes the means for the full sample of bonds which include both the Rule 144A and registered bonds. The second and third columns summarize the means for Rule 144A and registered bonds , respectively. The remaining columns summarize the means for the full sample, Rule 144A bonds and registered bonds before and after the amendment to Rule 144 on Feb. 15, 2008. Liquidity is the difference in yield spreads between the Rule 144A and matched registered bond; Spread is the spread between the 144A bond yield to maturity and the interpolated Treasury yield; YTM is the yield of the fixed coupon bond if held to maturity; Maturity is the time to maturity at issuance; Coupon is the coupon rate of the bond; Amount is the total amount issued in U.S. dollars; Moody is an indicator assigned corresponding to the bond's Moody's rating with Aaa=1, increasing in value as the rating decreases with Not Rated = 23; S&P is an indicator assigned corresponding to the bond's S&P rating with AAA = 1, increasing in value as the rating decreases with Not Rated = 23; Rating dif is the difference between the S&P and Moody's ratings; Invest. grade is an indicator for Moody's≥Baa3 and S&P≥BBB- ; U.S. is 1 if the firm is headquartered in the United States; Senior is 1 if the bond has senior payment rank; Subordinate is 1 if the bond has subordinate payment rank; Financial is 1 if the bond was issued by a financial firm; High rate is 1 if Moody's≥ Aa3 or S&P≥AA-; and Equity listed is 1 if the issuer or the issuer's parent company has stock publicly traded on a U.S. exchange. The sample period is from January 1, 2003 to December 31, 2011.

Variable	Full Sample	Rule 144A	Registered	Full Sample Before Amend	After Amend	Rule 144A Before Amend	After Amend	Registered Before Amend	After Amend
Liquidity	-	0.0002	-	-	-	-0.0079	0.0139	-	-
Spread	0.0214	0.0358*	0.0152*	0.0133*	0.0378*	0.0275*	0.0497*	0.0079*	0.0316*
YTM	0.0575	0.0719*	0.0514*	0.0550*	0.0625*	0.0691*	0.0765*	0.0496*	0.0554*
Maturity	9.3121	8.4024*	9.6967*	9.7734*	8.3699*	8.3433	8.5013	10.3213*	8.3027*
Coupon	0.0569	0.0704*	0.0512*	0.0548*	0.0612*	0.0684*	0.0736*	0.0495*	0.0549*
Amount	2.42E+08	3.86E+08	1.81E+08*	1.59E+08*	4.10E+08*	2.79E+08*	5.66E+08*	1.13E+08*	3.30E+08*
Moody[20]	7.0944	10.6739*	5.7544*	6.5373*	8.3376*	10.3059	11.2314	5.3629*	6.7792*
S&P[21]	7.1062	10.6921*	5.7356*	6.5850*	8.3038*	10.4009*	11.1761*	5.3280*	6.8075*
MSP	186.9557	282.6950*	146.4720*	162.4164*	237.0671*	277.6756*	291.0847*	118.2581*	209.4361*
Rating Dif	-0.2001	-0.2880	-0.1629	-0.3175*	0.0397*	-0.5956*	0.2260*	-0.2109*	-0.0556*
Invest. Grade	0.7752	0.4647*	0.9065*	0.8337*	0.6559*	0.4794*	0.4401*	0.9694*	0.7662*
U.S.	0.8768	0.7261*	0.9405*	0.9317*	0.7648*	0.7867*	0.6248*	0.9872*	0.8364*
Senior	0.8335	0.6857*	0.8961*	0.7951*	0.9120*	0.5800*	0.8624*	0.8775*	0.9374*
Subordinate	0.0803	0.0942*	0.0744*	0.1031*	0.0337*	0.1226*	0.0467*	0.0956*	0.0271*
Financial	0.6409	0.3624*	0.7587*	0.7115*	0.4969*	0.4227*	0.2616*	0.8221*	0.6172*
High Rate	0.3076	0.1810*	0.3612*	0.3592*	0.2022*	0.2255*	0.1066*	0.4105*	0.2511*
Equity Listed	0.6013	0.3757*	0.6966*	0.6350*	0.5324*	0.3839	0.3620	0.7312*	0.6195*

* statistically different at 1% level

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[20] Averages for Moody's ratings only include those indicators for bonds with ratings. Bonds without ratings, noted by an indicator equal to 23, are not included in Moody averages.

[21] Averages for S&P ratings only include those indicators for bonds with ratings. Bonds without ratings, noted by an indicator equal to 23, are not included in S&P averages.

Table 13: Means of Variables by Year
This table provides a summary variable means by year. Each variable contains the mean for each year for the full sample that includes both Rule 144A and registered bonds, and the Rule 144A and registered bond means separately. Liquidity is the difference in yield spreads between the Rule 144A and matched registered bond; Spread is the spread between the 144A bond yield to maturity and the interpolated Treasury yield; YTM is the yield of the fixed coupon bond if held to maturity; Maturity is the time to maturity at issuance; Coupon is the coupon rate of the bond; Amount is the total amount issued in U.S. dollars; Moody is an indicator assigned corresponding to the bond's Moody's rating with Aaa = 1, increasing in value as the rating decreases with Not Rated = 23; S&P is an indicator assigned corresponding to the bond's S&P rating with AAA = 1, increasing in value as the rating decreases with Not Rated = 23; MSP is an indicator for each unique pair of S&P and Moody's rating with S&P=1, Moody=1 as 1, S&P=1 and Moody=2 as 2 and so on; Rating dif is the difference between the S&P and Moody's ratings; Invest. grade is an indicator for Moody's≥Baa3 and S&P≥BBB- ; U.S. is 1 if the firm is headquartered in the United States; Senior is 1 if the bond has senior payment rank; Subordinate is 1 if the bond has subordinate payment rank; Financial is 1 if the bond was issued by a financial firm; High rate is 1 if Moody's≥ Aa3 or S&P≥AA-; Equity listed is 1 if the issuer or the issuer's parent company has stock publicly traded on a U.S. exchange; and .Reg rights is an indicator equal to 1 if the bond has a registration rights agreement. The sample period is from January 1, 2003 to December 31, 2011.

Variable	2003	2004	2005	2006	2007	2008	2009	2010	2011
Liquidity									
Rule 144A	-.0035424	-.0105603	-.0048101	-.0106245	-.0103674	.0201549	.0158466	.0116865	.0118383
Spread									
Full Sample	.0153203	.0120696	.0113244	.012766	.0145075	.0312969	.0433297	.0394143	.0360076
Rule 144A	.0322139	.0291621	0.027485	0.023401	0.023687	0.05723	0.053669	0.049117	0.044262
Registered	0.008949	0.005783	0.006215	0.008168	0.010283	0.025177	0.03693	0.032491	0.03197
YTM									
Full Sample	.0506141	.0515216	.0531864	.0611372	.0610907	.0629084	.0694977	.0630743	.0566687
Rule 144A	0.066664	0.067161	0.069275	0.071679	0.071106	0.090649	0.082238	0.074602	0.068644
Registered	0.044562	0.045769	0.0481	0.05658	0.056481	0.056362	0.061612	0.054848	0.05081
Maturity									
Full Sample	9.457276	9.899113	9.762374	10.10087	9.715885	8.695452	8.139345	8.280909	8.495776
Rule 144A	8.725958	8.731466	9.068932	7.906022	7.310218	8.643034	8.684833	8.351538	8.48423
Registered	9.733073	10.32859	9.98161	11.04975	10.82315	8.707822	7.801691	8.23051	8.501425
Coupon									
Full Sample	5.049337	5.117768	5.295213	6.099866	6.075105	6.08379	6.699154	6.220577	5.636149
Rule 144A	6.646426	6.595042	6.834472	7.141755	7.021289	8.053868	7.784559	7.319025	6.819678
Registered	4.447036	4.574403	4.808566	5.649437	5.639601	5.618889	6.027294	5.436751	5.057146
Amount									
Full Sample	1.46e+08	1.29e+08	1.14e+08	1.85e+08	2.22e+08	3.25e+08	5.45e+08	4.10e+08	3.81e+08
Rule 144A	2.74E+08	2.55E+08	2.50E+08	2.97E+08	3.13E+08	4.68E+08	5.91E+08	5.75E+08	5.73E+08
Registered	9.73E+07	8.35E+07	7.13E+07	1.37E+08	1.81E+08	2.91E+08	5.16E+08	2.92E+08	2.87E+08
Moody									
Full Sample	8.22269	8.1385	7.541799	7.778934	8.370356	9.36799	10.9303	11.47585	10.93756
Rule 144A	13.30879	14.4456	12.45668	11.49103	13.28452	14.17822	12.787	12.78422	12.62534
Registered	6.3046	5.818646	5.987929	6.17412	6.108493	8.232866	9.781006	10.54222	10.11186
S&P									
Full Sample	7.270238	7.510738	7.366843	7.917569	8.662289	9.073094	10.77985	11.64976	11.18235

Table **13: Means of Variables by Year (cont.)**

Variable	2003	2004	2005	2006	2007	2008	2009	2010	2011
Rule 144A	11.74505	13.43519	12.13803	11.6069	13.3631	13.24092	12.59206	13.25754	13.29339
Registered	5.582677	5.33163	5.858403	6.3226	6.49863	8.089564	9.658101	10.50248	10.1496
MSP
Full Sample	152.4382	157.8855	153.9792	166.883	184.603	195.0491	235.8668	256.4203	245.1317
Rule 144A	260.4451	300.4549	268.6314	255.4497	297.6357	295.7195	279.4043	294.7077	295.3733
Registered	111.7062	105.4461	117.7312	128.5939	132.577	171.2928	208.9173	229.0993	220.5526
Rating Dif
Full Sample	-.9524526	-.6277622	-.1749559	.1386345	.2919325	-.294896	-.1504486	.173913	.2447964
Rule 144A	-1.56374	-1.01042	-0.31865	0.115862	0.078571	-0.93729	-0.19495	0.473318	0.668044
Registered	-0.72192	-0.48702	-0.12953	0.148479	0.390137	-0.1433	-0.12291	-0.03974	0.037736
Invest. Grade
Full Sample	.851941	.8325552	.8518519	.8251457	.8003752	.7851292	.6425121	.5922705	.6447964
Rule 144A	0.491209	0.413194	0.494861	0.535172	0.476191	0.50165	0.445848	0.423434	0.428375
Registered	0.987982	0.986803	0.964717	0.950507	0.949589	0.852025	0.764246	0.712748	0.750674
U.S.
Full Sample	.9476377	.9399315	.9361552	.9109076	.9133208	.9218652	.8357488	.7173913	.6651584
Rule 144A	0.834066	0.797454	0.760646	0.751724	0.772619	0.722772	0.6787	0.62181	0.555096
Registered	0.990468	0.992337	0.991644	0.979726	0.978082	0.968847	0.932961	0.785596	0.719003
Senior
Full Sample	.798074	.8145036	.8116402	.7768526	.7639775	.8393195	.9213251	.9231884	.9425339
Rule 144A	0.616484	0.586806	0.637298	0.550345	0.508333	0.811881	0.870036	0.863109	0.871901
Registered	0.866556	0.898255	0.86676	8.75E-01	0.881644	0.845794	0.953073	0.96606	0.977089
Subordinate
Full Sample	.0929883	.1195145	.1093474	.1061615	.0885553	.0775047	.0338164	.0275362	.0104072
Rule 144A	0.161539	0.168982	0.126285	0.081379	0.065476	0.079208	0.057762	0.049884	0.023416
Registered	0.067136	0.10132	0.103993	1.17E-01	0.099178	0.077103	0.018994	0.011589	0.004043
Financial
Full Sample	.6307553	.7226891	.7541446	.7348043	.7339587	.6219282	.3416149	.4782609	.5402715
Rule 144A	0.321978	0.358796	0.399413	0.502069	0.55	0.247525	0.205776	0.291183	0.278237
Registered	0.747203	0.856535	0.866295	8.35E-01	0.81863	0.71028	0.425698	0.611755	0.668464
High Rate
Full Sample	.295817	.3688142	.3481481	.3713572	.4255159	.3068683	.1145618	.1816425	.2180995
Rule 144A	0.179121	0.12963	0.208517	0.33931	0.291667	0.132013	0.092058	0.105568	0.110193
Registered	0.339826	0.45679	0.392293	3.85E-01	0.487123	0.348131	0.128492	0.235927	0.27089
Equity Listed
Full Sample	0.626843	0.678805	0.631393	0.629475	0.600000	0.659105	0.620428	0.476812	0.444796
Rule 144A	0.489011	0.444444	0.380323	0.311724	0.271429	0.39604	0.415163	0.343388	0.331956
Registered	0.678823	0.765006	0.710771	0.766846	0.751233	0.721184	0.747486	0.57202	0.500000
Reg Rights
Rule 144A	.2824176	.4618056	.4126285	.297931	.2428571	.3333333	.4277978	.4048724	.392562

Table 14: Propensity Score Matching Quality
This table provides the summary data for determining the quality of the propensity score matching where Rule 144A bonds are the treatment group and registered bonds are the control group. The propensity score was calculated for the treatment (Rule 144A bonds) and control group (registered bonds). Propensity score was calculated using the yield spread, amount issued, S&P rating, senior payment rank indicator, bond's subsector, the listing status of the firm and the year the bond was issued. Panel A provides a data summary of the difference in propensity scores between the Rule 144A and matched registered bonds. Panel B provides the t-test results for the means of the propensity score dependent variables and Panel C provides the summary statistics for the amount issued of 6,465 Rule 144A and 15,289 registered bonds.

Panel A: This panel provides the average difference in propensity score between the Rule 144A sample and the matched registered bonds. The mean of the difference, median, standard deviation, minimum and maximum values are provided. The propensity score was calculated for the treatment (Rule 144A bonds) and control group (registered bonds). Propensity score was calculated using the yield spread, amount issued, S&P rating, senior payment rank indicator, bond's subsector, the listing status of the firm and the year the bond was issued.

	Mean	Median	Std. Dev	Min	Max
Propensity Score Difference	.0001312	.0000535	.0002466	0	.0033686

Panel B: This panel provides the means of propensity score variables, the difference in the means and indicates if the difference is statistically significant using a two-sample t-test. Before matching, differences are expected, but after matching, differences should not be significant between the Rule 144A bonds and their matched registered bond.

	144A (means)	Registered (means)	Difference
Propensity score	0.5094	0.5094	0.0000
Spread	0.0358	0.0356	0.0002
S&P Rating	12.7253	12.2670	.4583[***]
Senior	0.6857	0.6948	-0.0091
Amount Issued	3.86E+08	4.98E+08	-1.12E+08[***]
Subsector	1.00E+09	1.00E+09	-5.49E+03
Listed	0.3757	0.4172	-.0415[***]

Panel C: This panel provides the summary statistics for the amount issued between Rule 144A and registered bonds. The amount issued is in dollars.

	Mean	Median	Std. Dev	Min	Max
144A Amount Issued ($)	3.86e+08	2.50e+08	4.33e+08	40000	6.15e+09
Reg Amount Issued ($)	1.81e+08	5.07e+06	4.48e+08	10000	8.25e+09

Table 15: OLS and Fixed Effects Liquidity Premium Analysis
This table provides the regression results with liquidity premium as the dependent variable. The following regressions were performed: Column 1: Rule 144A OLS regression with liquidity premium as the dependent variable; Column 2: Rule 144A firm FE regression with liquidity premium as the dependent variable; Column 3: Rule 144A OLS regression with liquidity premium as the dependent variable for firms that issued only one bond during the sample period. All three analyses controlled for industry and S&P rating category fixed effects. Liquidity premium is the difference in yield spreads between the Rule 144A and matched registered bond; Time to Maturity is the time to maturity at issuance; Coupon rate is the coupon rate of the bond; Amount Issued is the total amount issued in U.S. dollars; Senior is 1 if the bond has senior payment rank; Subordinate is 1 if the bond has subordinate payment rank; Equity Listed is equal to 1 if the firm has stock publicly trading on a U.S. exchange; Treasury Proxy is the Treasury proxy for two period off the run and on the run differences; and U.S. Indicator is 1 if the firm is headquartered in the United States. The sample period is from January 1, 2003 to December 31, 2011.

VARIABLES	OLS Liquidity Premium	FE Liquidity Premium	OLS Liquidity Premium
Time to Maturity	-0.000423***	-0.000274***	-0.000355**
	(7.21e-05)	(0.000103)	(0.000180)
Coupon rate	0.420***	0.366***	0.560***
	(0.0362)	(0.0656)	(0.0610)
Amount Issued	-2.05e-11***	-2.36e-11***	-2.07e-11***
	(2.02e-12)	(3.07e-12)	(4.40e-12)
Senior Payment Rank	0.0244***	0.0270***	0.0288***
	(0.00145)	(0.00261)	(0.00291)
Subordinate Payment Rank	-0.00322**	-0.00113	-0.00283
	(0.00160)	(0.00302)	(0.00253)
U.S. Indicator	0.000378		0.000530
	(0.00124)		(0.00205)
Equity Listed	0.0115***	0.0188***	0.0159***
	(0.000904)	(0.00434)	(0.00173)
Treasury Proxy	-0.000578	0.00453	0.0112
	(0.0128)	(0.0214)	(0.0259)
y03	-0.0208***	-0.0122**	-0.0216***
	(0.00408)	(0.00534)	(0.00445)
y04	-0.0250***	-0.0150***	-0.0280***
	(0.00407)	(0.00488)	(0.00440)
y05	-0.0217***	-0.0140***	-0.0255***
	(0.00390)	(0.00470)	(0.00467)
y06	-0.0242***	-0.0169***	-0.0224***
	(0.00377)	(0.00464)	(0.00449)
y07	-0.0187***	-0.00903*	-0.0223***
	(0.00386)	(0.00478)	(0.00434)
y09	-0.00435	0.00533	-0.00815*
	(0.00397)	(0.00635)	(0.00478)
y10	-0.00588	0.00324	-0.00769*
	(0.00402)	(0.00568)	(0.00414)
y11	-0.00358	0.000538	-0.00141
	(0.00406)	(0.00545)	(0.00414)

Table 15: OLS and Fixed Effects Liquidity Premium Analysis (cont.)

VARIABLES	OLS Liquidity Premium	FE Liquidity Premium	OLS Liquidity Premium
Constant	-0.0150**	-0.0245***	-0.0376***
	(0.00690)	(0.00645)	(0.0108)
Fixed Effects	Industry	Industry	Industry
	S&P Rating	S&P Rating	S&P Rating
Observations	6,455	6,455	1,744
R-squared	0.363		0.407
Within R-sq		0.156	
Between R-sq		0.369	
Overall R-sq		0.342	
# of Firms		2,977	
Robust standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Table 16: OLS and Fixed Effects Yield Spread Analysis

This table provides the regression results with the yield spread as the dependent variable. The following regressions were performed: Column 1:Rule 144A yield spread OLS regression; Column 2: Registered bond yield spread OLS regression; Column 3: Rule 144A yield spread firm FE regression; Column 4: Registered bond yield spread firm FE regression. The OLS regressions control for industry and S&P rating category fixed effects. Firm FE regressions controls for S&P rating category fixed effects. Spread is the yield spread between the 144A bond yield to maturity and the interpolated Treasury yield; Maturity is the time to maturity at issuance; Coupon is the coupon rate of the bond; Amt Issued is the total amount issued in U.S. dollars; Callable is an indicator for callable bonds; Senior is 1 if the bond has senior payment rank; Subordinate is 1 if the bond has subordinate payment rank; Equity is 1 if the firm has stock publicly traded on a U.S. exchange; and, U.S. is 1 if the firm is headquartered in the United States. The sample period is from January 1, 2003 to December 31, 2011.

VARIABLES	OLS 144A Spread	OLS Reg Spread	FE 144A Spread	FE Reg Spread
Maturity	-0.000781***	-0.000635***	-0.000550***	-0.000489***
	(3.81e-05)	(1.07e-05)	(5.79e-05)	(7.82e-05)
Coupon	0.900***	0.924***	0.817***	0.834***
	(0.0187)	(0.00805)	(0.0554)	(0.0690)
Amt Issued	6.51e-13	8.60e-13***	-2.09e-12*	6.68e-13**
	(6.09e-13)	(1.38e-13)	(1.26e-12)	(2.98e-13)
Callable	-0.00193***	0.000679***	-0.00283***	-0.00127**
	(0.000439)	(0.000152)	(0.000995)	(0.000534)
US	0.00136**	0.000789*		
	(0.000656)	(0.000460)		
Senior	-0.000968	0.00188***	-0.000121	0.000234
	(0.000654)	(0.000255)	(0.00129)	(0.00137)
Subordinate	-0.00245***	0.00180***	0.000187	0.00215
	(0.000437)	(0.000232)	(0.00116)	(0.00213)
Equity	-0.00155***	-0.00171***	0.00252**	0.000265
	(0.000437)	(0.000163)	(0.00127)	(0.000845)
y03	-0.0120***	-0.00342***	-0.00847*	-0.00603***
	(0.00328)	(0.000236)	(0.00505)	(0.00131)
y04	-0.0152***	-0.00721***	-0.0127***	-0.00930***
	(0.00337)	(0.000219)	(0.00488)	(0.00129)
y05	-0.0183***	-0.00960***	-0.0171***	-0.0110***
	(0.00324)	(0.000216)	(0.00514)	(0.00149)
y06	-0.0253***	-0.0148***	-0.0232***	-0.0149***
	(0.00311)	(0.000249)	(0.00540)	(0.00176)
y07	-0.0242***	-0.0129***	-0.0205***	-0.0129***
	(0.00322)	(0.000251)	(0.00547)	(0.00176)
y09	-0.00104	0.00721***	0.00149	0.00700***
	(0.00320)	(0.000316)	(0.00753)	(0.00102)
y10	-0.00218	0.00794***	-0.00231	0.00437***
	(0.00331)	(0.000315)	(0.00574)	(0.00151)
y11	-0.00228	0.0109***	-0.00316	0.00643***
	(0.00330)	(0.000323)	(0.00517)	(0.00162)
Constant	-0.00942**	-0.0241***	-0.00322	-0.0162***
	(0.00458)	(0.00210)	(0.00627)	(0.00375)
Fixed Effects	Industry S&P Rating	Industry S&P Rating	S&P Rating	S&P Rating

Table 16: OLS and Fixed Effects Yield Spread Analysis (cont.)

VARIABLES	OLS 144A Spread	OLS Reg Spread	FE 144A Spread	FE Reg Spread
Observations	6,465	15,289	6,465	15,289
R-squared	0.756	0.897		
Within R-sq			0.502	0.766
Between R-sq			0.822	0.939
Overall R-sq			0.736	0.881
# of firms			2,978	1,200

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 17: Probit Analysis

This table provides the probit analysis determining the probability of a bond being issued with registration rights agreements. Column 1 uses year indicators in the analysis; Column 2 uses an amendment indicator equal to 1 if the bond was issued after the Rule 144 Feb. 15, 2008 amendment. The probit analysis controls for industry and S&P rating category fixed effects. Firm FE regressions also controls for the following fixed effects: S&P rating and S&P ratings interacted with the amendment indicator. Reg rights is 1 if the bond has a registration rights agreement; Time to Maturity is the time to maturity at issuance; Coupon rate is the coupon rate of the bond; Amount Issued is the total amount issued in U.S. dollars; Senior payment rank is 1 if the bond has senior payment rank; U.S. Indicator is 1 if the firm is headquartered in the United States; and Amendment is 0 for before February 15, 2008 and 1 after ; Equity is 1 if the firm has stock publicly traded on a U.S. exchange; Subordinate payment rank is 1 if the bond has subordinate payment rank; and Callable is an indicator equal to 1 for callable bonds. The sample period is from January 1, 2003 to December 31, 2011.

VARIABLES	Probit(reg. rights)	Probit(reg. rights)
Time to Maturity	-0.00282	-0.000843
	(-0.00085)	(-0.00026)
Coupon rate	1.840	0.743
	(0.55547)	(0.22723)
Amount Issued	5.46e-10***	5.25e-10***
	(1.65e-10)	(1.61e-10)
Senior payment rank	0.266***	0.249***
	(0.07685)	(0.07319)
U.S. Indicator	0.754***	0.709***
	(0.19749)	(0.19041)
Equity Listed	0.746***	0.713***
	(0.23606)	(0.22790)
Subordinate payment rank	0.348***	0.283***
	(0.11508)	(0.09318)
Callable	0.879***	0.866***
	(0.22788)	(0.22844)
y03	-0.468***	
	(-0.12278)	
y04	0.405***	
	(0.13438)	
y05	0.376***	
	(0.12495)	
y06	0.163	
	(0.05141)	
y07	0.0646	
	(0.01987)	
y09	-0.0862	
	('-0.02533)	
y10	-0.0598	
	(-0.01774)	
y11	0.0207	
	(0.00629)	
Amend		-0.0996**
		(-0.03019)

Table 17: Probit Analysis (cont.)

VARIABLES	Probit(reg. rights)	Probit(reg. rights)
Constant	-2.330***	-2.125***
Fixed Effects	Industry	Industry
	S&P Rating	S&P Rating
Observations	6,303	6,303
psuedo R-sq	0.440	0.421
Marginal effects in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Table 18: Sensitivity Analysis Before and After Amendment
This table provides the FE regression results with the liquidity premium as the dependent variable. Column 1:Rule 144A liquidity premium as the explanatory variable for bonds issued before Feb. 15, 2008; Column 2: Rule 144A liquidity premium as the explanatory variable for bonds issued on or after Feb. 15, 2009. The regressions control for S&P rating category fixed effects. Liquidity Premium is the difference in yield spreads between the Rule 144A and matched registered bond; Yrs to Maturity is the time to maturity at issuance; Coupon is the coupon rate of the bond; Amt Issued is the total amount issued in U.S. dollars; Senior is 1 if the bond has senior payment rank; Subordinate is 1 if the bond has subordinate payment rank; Equity Listed is 1 if the firm has equity trading on a U.S. exchange; Treasury Proxy is the Treasury proxy for two period off the run and on the run differences; and, U.S. is 1 if the firm is headquartered in the United States. The sample period is from January 1, 2003 to December 31, 2011.

VARIABLES	FE Pre-Amend Liquidity Premium	FE Post-Amend Liquidity Premium
Time to Maturity	-0.000312**	-0.000274*
	(0.000132)	(0.000158)
Coupon	0.285***	0.514***
	(0.0643)	(0.147)
Amt Issued	-2.22e-11***	-2.48e-11***
	(4.48e-12)	(4.57e-12)
Senior	0.0257***	0.0361***
	(0.00341)	(0.00580)
Subordinate	6.21e-05	0.00261
	(0.00460)	(0.00805)
Equity Listed	0.0237***	0.0230***
	(0.00829)	(0.00817)
Treasury Proxy	-0.0181	0.0686
	(0.0160)	(0.0535)
Constant	-0.0349***	-0.0444***
	(0.00587)	(0.00944)
Fixed Effects	S&P Rating	S&P Rating
Observations	4,037	2,418
Within R-sq	0.103	0.265
Between R-sq	0.2711	0.285
Overall R-sq	0.2874	0.248
Number of Firms	1,942	1,460

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 19: Sensitivity Analysis: U.S. Firms and Publicly Traded Firms
This table provides the FE regression results with the liquidity premium as the dependent variable. Column 1: Rule 144A liquidity premium as the dependent variable for bonds issued by non-U.S. firms; and, Column 2: Rule 144A liquidity premium as the dependent variable for bonds issued by U.S. firms. Column 3:Rule 144A liquidity premium as the dependent variable for bonds without equity listed on a U.S. exchange; Column 4: Rule 144A liquidity premium as the dependent variable for bonds listed on a U.S. exchange; Firm FE regressions also controls for the following fixed effects: S&P rating and S&P ratings interacted with the amendment indicator. Liquidity Premium is the difference in yield spreads between the Rule 144A and matched registered bond; Time to Maturity is the time to maturity at issuance; Coupon is the coupon rate of the bond; Amt Issued is the total amount issued in U.S. dollars; Senior is 1 if the bond has senior payment rank; Subordinate is 1 if the bond has subordinate payment rank; Treasury Proxy is the Treasury proxy for two period off the run and on the run differences; and, Listed is 1 if the firm has stock trading on a U.S. exchange. The sample period is from January 1, 2003 to December 31, 2011.

VARIABLES	Non-U.S. Firms Liquidity Premium	U.S. Firms Liquidity Premium	Not -Listed Liquidity Premium	Listed Liquidity Premium
Time to Mty	-0.000343	-0.000208*	-0.000289*	-9.28e-05
	(0.000221)	(0.000113)	(0.000148)	(0.000138)
Coupon	0.320***	0.397***	0.318***	0.399***
	(0.119)	(0.0796)	(0.0888)	(0.0698)
Amt Issued	-2.09e-11***	-2.53e-11***	-2.39e-11***	-2.45e-11***
	(5.07e-12)	(3.90e-12)	(4.15e-12)	(3.53e-12)
Senior	0.0341***	0.0231***	0.0309***	0.0170***
	(0.00540)	(0.00293)	(0.00366)	(0.00294)
Subordinate	-0.00109	-5.59e-05	0.000934	-0.00227
	(0.00728)	(0.00340)	(0.00474)	(0.00304)
Treas Proxy	0.0308	-0.00233	0.0186	-0.00956
	(0.0550)	(0.0213)	(0.0337)	(0.0142)
Listed	0.0163	0.0190***		
	(0.0107)	(0.00480)		
y03	-0.00367	-0.0151**	-0.0157*	-0.00835**
	(0.0104)	(0.00597)	(0.00840)	(0.00357)
y04	-0.00614	-0.0175***	-0.0196**	-0.0112***
	(0.00835)	(0.00543)	(0.00766)	(0.00351)
y05	0.00154	-0.0182***	-0.0179**	-0.00870**
	(0.00692)	(0.00558)	(0.00731)	(0.00342)
y06	-0.00609	-0.0206***	-0.0186**	-0.0142***
	(0.00681)	(0.00560)	(0.00723)	(0.00332)
y07	0.000556	-0.0128**	-0.00941	-0.00901***
	(0.00675)	(0.00585)	(0.00732)	(0.00341)
y09	0.0154**	0.00144	0.00192	0.00884**
	(0.00723)	(0.00794)	(0.00994)	(0.00386)
y10	0.0130	-0.000220	-0.00129	0.00625
	(0.00806)	(0.00674)	(0.00884)	(0.00397)
y11	0.0109	-0.00368	-0.00390	0.00197
	(0.00890)	(0.00607)	(0.00864)	(0.00401)
Constant	-0.0338***	-0.0223***	-0.0143	-0.0161**
	(0.0123)	(0.00668)	(0.00875)	(0.00625)
Fixed Effects	S&P Rating	S&P Rating	S&P Rating	S&P Rating
Observations	1,770	4,685	4,032	2,423
Within R-sq	0.190	0.152	0.139	0.246
Between R-sq	0.383	0.342	0.2812	0.487
Overall R-sq	0.329	0.344	0.2675	0.487
Number of Firms	936	2,041	1,896	1,145

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 20: Variable Means by Credit Rating

This table provides a summary variable means by S&P rating. The table is separated into seven different panels: Panel A contains the means by S&P rating for the entire sample of Rule 144A and registered bonds; Panel B contains the means for Rule 144A bonds; Panel C contains the means for registered bonds; Panel D contains the means for Rule 144A bonds issued before the amendment; Panel E contains the means for Rule 144A bonds issued after the amendment; Panel F contains the means for registered bonds issued before the amendment; and, Panel G contains the means for registered bonds issued after the amendment. Count is the number of bonds in that credit rating; YTM is the yield of the fixed coupon bond if held to maturity; Spread is the spread between the 144A bond yield to maturity and the interpolated Treasury yield; Coupon is the coupon rate of the bond; Amount is the total amount issued in U.S. dollars; Amount issued is the dollar value of the bond issue; and Time to Maturity is the time to maturity at issuance. The sample period is from January 1, 2003 to December 31, 2011.

Panel A: This panel contains the means for yield to maturity, yield spread, coupon rate, amount issued and time to maturity by S&P rating for the entire sample of Rule 144A and registered bonds. Count is the number of bonds in that credit rating; YTM is the yield to maturity of the bond; Spread is the yield spread between the 144A bond yield to maturity and the interpolated Treasury yield; Coupon is the coupon rate of the bond; Amount Issued is the total amount issued in U.S. dollars; Time to Maturity is the time to maturity of the bond at issue.

S&P Rating	Count	YTM	Spread	Coupon	Amount Issued	Time to Maturity
AAA	1710	0.0445	0.0056	0.0446	2.25e+08	8.6018
AA+	509	0.0461	0.0063	0.0460	1.09e+08	10.0546
AA	1307	0.0465	0.0073	0.0465	1.71e+08	10.0227
AA-	1771	0.0465	0.0896	0.0465	1.42e+08	7.9402
A+	1522	0.0469	0.0115	0.0463	2.99e+08	10.2886
A	4854	0.0490	0.0099	0.0489	1.31e+08	11.0670
A-	1176	0.0515	0.0150	0.0513	3.61e+08	11.7597
BBB+	1064	0.0523	0.0180	0.0520	3.95e+08	10.5523
BBB	1266	0.0542	0.0182	0.0539	3.38e+08	10.3036
BBB-	835	0.0598	0.0255	0.0587	4.16e+08	10.6037
BB+	290	0.0696	0.0350	0.0688	5.01e+08	9.0579
BB	309	0.0784	0.0434	0.0774	4.79e+08	8.8400
BB-	463	0.0806	0.0457	0.0793	4.38e+08	8.4656
B+	557	0.0889	0.0548	0.0876	4.23e+08	8.0421
B	642	0.0939	0.0599	0.0926	3.90e+08	7.7032
B-	698	0.0984	0.0618	0.0960	3.56e+08	7.9306
CCC+	262	0.1036	0.0664	0.0998	3.40e+08	7.9067
CCC	97	0.1047	0.0685	0.1028	4.24e+08	7.4422
CCC-	16	0.1089	0.0712	0.1056	4.97e+08	7.1632
CC	6	0.0871	0.0620	0.0871	2.21e+08	8.7264
C	2	0.1206	0.1006	0.1206	9.18e+07	4.2834
D	162	0.0529	0.0043	0.0529	9.33e+07	1.5704
Not rated	2236	0.0694	0.0432	0.0678	1.11e+08	5.2730

Table 20: Variable Means by Credit Rating (cont.)

Panel B: This panel contains the means for yield to maturity, yield spread, coupon rate, amount issued and time to maturity by S&P rating for the full sample of Rule 144A bonds. Count is the number of bonds in that credit rating; YTM is the yield to maturity of the bond; Spread is the yield spread between the 144A bond yield to maturity and the interpolated Treasury yield; Coupon is the coupon rate of the bond; Amount Issued is the total amount issued in U.S. dollars; Time to Maturity is the time to maturity of the bond at issue.

S&P Rating	Count	YTM	Spread	Coupon	Amount Issued	Time to Maturity
AAA	665	0.0414	0.0047	0.0415	2.39E+08	3.4837
AA+	13	0.0382	0.0102	0.0379	4.10E+08	5.7569
AA	180	0.0461	0.0107	0.0458	4.53E+08	9.8194
AA-	79	0.0511	0.0157	0.0507	6.82E+08	9.0339
A+	146	0.0500	0.0194	0.0449	7.23E+08	9.9165
A	192	0.0549	0.0188	0.0545	5.82E+08	12.9012
A-	222	0.0539	0.0183	0.0534	5.92E+08	11.9613
BBB+	287	0.0567	0.0199	0.0560	5.95E+08	12.9748
BBB	344	0.0593	0.0219	0.0588	4.67E+08	11.8040
BBB-	331	0.0624	0.0261	0.0602	4.83E+08	11.2737
BB+	187	0.0716	0.0360	0.0707	5.60E+08	9.3504
BB	237	0.0796	0.0443	0.0786	4.64E+08	8.5741
BB-	369	0.0811	0.0452	0.0800	4.50E+08	8.5318
B+	455	0.0890	0.0546	0.0879	4.05E+08	8.0369
B	554	0.0942	0.0599	0.0929	3.81E+08	7.6963
B-	622	0.0988	0.0618	0.0964	3.41E+08	7.9661
CCC+	241	0.1040	0.0662	0.1003	3.28E+08	7.9506
CCC	90	0.1048	0.0682	0.1029	4.13E+08	7.4259
CCC-	13	0.1050	0.0648	0.1026	5.69E+08	7.4929
CC	6	0.0871	0.0620	0.0871	2.21E+08	8.7264
C	2	0.1206	0.1006	0.1206	9.18E+07	4.2834
D	162	0.0529	0.0043	0.0529	9.33E+07	1.5704
Not rated	1068	0.0710	0.0359	0.0680	2.16E+08	8.0070

Table 20: Variable Means by Credit Rating (cont.)

Panel C: This panel contains the means for yield to maturity, yield spread, coupon rate, amount issued and time to maturity by S&P rating for the full sample of registered bonds. Count is the number of bonds in that credit rating; YTM is the yield to maturity of the bond; Spread is the yield spread between the 144A bond yield to maturity and the interpolated Treasury yield; Coupon is the coupon rate of the bond; Amount Issued is the total amount issued in U.S. dollars; Time to Maturity is the time to maturity of the bond at issue.

S&P Rating	Count	YTM	Spread	Coupon	Amount Issued	Time to Maturity
AAA	1045	0.0466	0.0063	0.0465	2.17E+08	11.8588
AA+	496	0.0463	0.0062	0.0462	1.01E+08	10.1672
AA	1127	0.0466	0.0067	0.0466	1.26E+08	10.0552
AA-	1692	0.0463	0.0086	0.0462	1.16E+08	7.8891
A+	1376	0.0466	0.0106	0.0465	2.54E+08	10.3281
A	4662	0.0487	0.0095	0.0487	1.12E+08	10.9914
A-	954	0.0510	0.0142	0.0508	3.07E+08	11.7127
BBB+	777	0.0507	0.0174	0.0505	3.21E+08	9.6575
BBB	922	0.0523	0.0169	0.0520	2.89E+08	9.7438
BBB-	504	0.0581	0.0251	0.0576	3.73E+08	10.1637
BB+	103	0.0659	0.0331	0.0654	3.92E+08	8.5268
BB	72	0.0742	0.0402	0.0735	5.27E+08	9.7132
BB-	94	0.0788	0.0477	0.0766	3.92E+08	8.2059
B+	102	0.0885	0.0556	0.0859	5.07E+08	8.0652
B	88	0.0919	0.0598	0.0905	4.47E+08	7.7462
B-	76	0.0955	0.0621	0.0928	4.82E+08	7.6396
CCC+	21	0.0994	0.0687	0.0936	4.88E+08	7.4030
CCC	7	0.1043	0.0731	0.1023	5.54E+08	7.6511
CCC-	3	0.1254	0.0991	0.1188	1.85E+08	5.7349
CC	0					
C	0					
D	0					
Not rated	1168	0.0680	0.0499	0.0677	1.40E+07	2.7731

Table 20: Variable Means by Credit Rating (cont.)
Panel D: This panel contains the means for yield to maturity, yield spread, coupon rate, amount issued and time to maturity by S&P rating for Rule 144A bonds issued before the amendment. Count is the number of bonds in that credit rating; YTM is the yield to maturity of the bond; Spread is the yield spread between the 144A bond yield to maturity and the interpolated Treasury yield; Coupon is the coupon rate of the bond; Amount Issued is the total amount issued in U.S. dollars; Time to Maturity is the time to maturity of the bond at issue.

S&P Rating	Count	YTM	Spread	Coupon	Amount Issued	Time to Maturity
AAA	602	0.0420	0.0037	0.0422	1.48E+08	3.0685
AA+	8	0.0474	0.0103	0.0471	4.54E+08	6.5962
AA	117	0.0489	0.0082	0.0486	2.13E+08	10.0785
AA-	43	0.0563	0.0135	0.0562	4.26E+08	8.4311
A+	65	0.0513	0.0105	0.0510	5.61E+08	10.8985
A	101	0.0575	0.0141	0.0575	3.77E+08	14.0347
A-	109	0.0543	0.0121	0.0537	4.88E+08	12.7549
BBB+	157	0.0574	0.0134	0.0564	4.56E+08	14.3477
BBB	216	0.0591	0.0169	0.0586	3.78E+08	12.4768
BBB-	195	0.0610	0.0192	0.0607	3.84E+08	12.0657
BB+	101	0.0688	0.0264	0.0687	4.56E+08	10.0946
BB	115	0.0757	0.0329	0.0754	3.48E+08	9.3607
BB-	194	0.0761	0.0336	0.0759	3.89E+08	9.1990
B+	238	0.0848	0.0438	0.0847	3.38E+08	8.6443
B	305	0.0900	0.0486	0.0896	2.98E+08	8.3427
B-	412	0.0967	0.0548	0.0951	3.06E+08	8.2632
CCC+	161	0.1062	0.0631	0.1017	2.71E+08	8.0913
CCC	58	0.1026	0.0608	0.1022	3.79E+08	7.5284
CCC-	11	0.1005	0.0575	0.0984	6.13E+08	7.8111
CC	0					
C	0					
D	162	0.0529	0.0043	0.0529	9.33E+07	1.5704
Not rated	675	0.0689	0.0277	0.0675	1.33E+08	8.1832

Table 20: Variable Means by Credit Rating (cont.)

Panel E: This panel contains the means for yield to maturity, yield spread, coupon rate, amount issued and time to maturity by S&P rating for Rule 144A bonds issued after the amendment. Count is the number of bonds in that credit rating; YTM is the yield to maturity of the bond; Spread is the yield spread between the 144A bond yield to maturity and the interpolated Treasury yield; Coupon is the coupon rate of the bond; Amount Issued is the total amount issued in U.S. dollars; Time to Maturity is the time to maturity of the bond at issue.

S&P Rating	Count	YTM	Spread	Coupon	Amount Issued	Time to Maturity
AAA	63	0.0357	0.0135	0.0344	1.11E+09	7.4509
AA+	5	0.0236	0.0099	0.0232	3.40E+08	4.4140
AA	63	0.0408	0.0153	0.0405	8.97E+08	9.3381
AA-	36	0.0449	0.0182	0.0442	9.88E+08	9.7539
A+	81	0.0489	0.0266	0.0400	8.52E+08	9.1284
A	91	0.0521	0.0241	0.0512	8.10E+08	11.6432
A-	113	0.0536	0.0242	0.0530	6.93E+08	11.1957
BBB+	130	0.0559	0.0276	0.0555	7.63E+08	11.3169
BBB	128	0.0596	0.0301	0.0591	6.16E+08	10.6686
BBB-	136	0.0644	0.0358	0.0596	6.24E+08	10.1382
BB+	86	0.0748	0.0473	0.0731	6.83E+08	8.4765
BB	122	0.0833	0.0551	0.0816	5.74E+08	7.8326
BB-	175	0.0866	0.0581	0.0845	5.18E+08	7.7921
B+	217	0.0935	0.0665	0.0914	4.78E+08	7.3708
B	249	0.0994	0.0738	0.0969	4.81E+08	6.9046
B-	210	0.1027	0.0754	0.0990	4.09E+08	7.3833
CCC+	80	0.0996	0.0724	0.0974	4.41E+08	7.6672
CCC	32	0.1088	0.0815	0.1041	4.76E+08	7.2401
CCC-	2	0.1300	0.1052	0.1256	3.25E+08	5.7426
CC	6	0.0871	0.0620	0.0871	2.21E+08	8.7264
C	2	0.1206	0.1006	0.1206	9.18E+07	4.2834
D	0					
Not rated	393	0.0746	0.0499	0.0687	3.59E+08	7.7046

Table 20: Variable Means by Credit Rating (cont.)

Panel F: This panel contains the means for yield to maturity, yield spread, coupon rate, amount issued and time to maturity by S&P rating for registered bonds issued before the amendment. Count is the number of bonds in that credit rating; YTM is the yield to maturity of the bond; Spread is the yield spread between the 144A bond yield to maturity and the interpolated Treasury yield; Coupon is the coupon rate of the bond; Amount Issued is the total amount issued in U.S. dollars; Time to Maturity is the time to maturity of the bond at issue.

S&P Rating	Count	YTM	Spread	Coupon	Amount Issued	Time to Maturity
AAA	929	0.0473	0.0050	0.0473	8.23E+07	12.4604
AA+	379	0.0468	0.0037	0.0468	5.30E+07	9.9439
AA	991	0.0471	0.0055	0.0470	6.25E+07	10.3422
AA-	1190	0.0485	0.0065	0.0484	7.85E+07	6.9983
A+	980	0.0463	0.0075	0.0462	2.12E+08	10.1726
A	3628	0.0499	0.0069	0.0498	5.73E+07	11.4652
A-	644	0.0513	0.0099	0.0512	1.95E+08	12.1162
BBB+	516	0.0496	0.0135	0.0495	2.07E+08	8.7525
BBB	593	0.0511	0.0113	0.0509	2.17E+08	9.1568
BBB-	192	0.0600	0.0174	0.0598	3.98E+08	11.9606
BB+	51	0.0666	0.0253	0.0664	4.29E+08	9.3507
BB	21	0.0688	0.0273	0.0700	2.89E+08	9.1276
BB-	20	0.0726	0.0290	0.0723	3.25E+08	9.3262
B+	31	0.0772	0.0347	0.0774	7.17E+08	8.8622
B	30	0.0813	0.0375	0.0813	4.08E+08	8.9553
B-	29	0.0873	0.0427	0.0871	4.79E+08	8.3571
CCC+	5	0.0915	0.0483	0.0908	1.54E+08	10.4241
CCC	1	0.0925	0.0613	0.0925	6.25E+08	7.1348
CCC-	0					
CC	0					
C	0					
D	0					
Not rated	328	0.0514	0.0076	0.0514	2.39E+07	5.3066

Table 20: Variable Means by Credit Rating (cont.)
Panel G: This panel contains the means for yield to maturity, yield spread, coupon rate, amount issued and time to maturity by S&P rating for registered bonds issued after the amendment. Count is the number of bonds in that credit rating; YTM is the yield to maturity of the bond; Spread is the yield spread between the 144A bond yield to maturity and the interpolated Treasury yield; Coupon is the coupon rate of the bond; Amount Issued is the total amount issued in U.S. dollars; Time to Maturity is the time to maturity of the bond at issue.

S&P Rating	Count	YTM	Spread	Coupon	Amount Issued	Time to Maturity
AAA	116	0.0405	0.0165	0.0403	1.29E+09	7.0411
AA+	117	0.0445	0.0145	0.0444	2.57E+08	10.8905
AA	136	0.0434	0.0155	0.0431	5.90E+08	7.9637
AA-	502	0.0412	0.0137	0.0411	2.07E+08	10.0008
A+	396	0.0472	0.0184	0.0471	3.59E+08	10.7131
A	1034	0.0448	0.0190	0.0446	3.05E+08	9.3292
A-	310	0.0503	0.0232	0.0500	5.40E+08	10.8746
BBB+	261	0.0530	0.0251	0.0525	5.46E+08	11.4466
BBB	329	0.0544	0.0268	0.0539	4.20E+08	10.8018
BBB-	312	0.0569	0.0298	0.0563	3.57E+08	9.0579
BB+	52	0.0652	0.0407	0.0643	3.56E+08	7.7187
BB	51	0.0764	0.0455	0.0749	6.26E+08	9.9544
BB-	74	0.0804	0.0527	0.0778	4.10E+08	7.9031
B+	71	0.0935	0.0648	0.0897	4.16E+08	7.7172
B	58	0.0974	0.0713	0.0953	4.67E+08	7.1208
B-	47	0.1006	0.0740	0.0963	4.83E+08	7.1968
CCC+	16	0.1019	0.0751	0.0945	5.92E+08	6.4589
CCC	6	0.1062	0.0750	0.1040	5.43E+08	7.7372
CCC-	3	0.1254	0.0991	0.1188	1.85e+08	5.7349
CC	0					
C	0					
D	0					
Not rated	840	0.0745	0.0664	0.0741	1.02E+07	1.7839

Table 21: Average Number of Issues by Industry
This table provides the average Rule 144A bonds issued per firm based on the firm industry. The total sample includes 6,465 bonds issued between January 1, 2003 and December 31, 2011. There are a total of 2,978 firms issuing bonds in the sample.

INDUSTRY_SECTOR	Rule 144A (mean)
Basic Materials	2.62
Communications	3.40
Consumer, Cyclic	2.99
Consumer, Non-cy	3.05
Diversified	2.60
Energy	3.16
Financial	27.66
Industrial	2.63
Technology	2.90
Utilities	3.42

Table 22: Liquidity Premium by Total Number of Issues
This table provides data statistics based on the number of bonds issued in the Rule 144A market by firm. The first column provides the number of bonds issued and the second column provides the number of firms that issued that corresponding number of bonds in the sample. Column 3 provides the average liquidity premium for the number of bonds issued by firms as specified in Column 1. Column 4 provides the corresponding standard deviation and Columns 5 and 6 list the minimum and maximum liquidity premiums specific to each issue group. The sample period is from January 1, 2003 to December 31, 2011.

Number of Issues	Number Rule 144A Firms	Average Liquidity Premium	Std. Dev. Liquidity Premium	Min Liquidity Premium	Max Liquidity Premium
1	1745	.0088684	.040983	-.2212827	.139073
2	624	.0079655	.0374325	-.168603	.2244333
3	255	.0029512	.0356427	-.1919296	.1061558
4	141	.0037187	.0474868	-.1744356	.359329
5	71	.0002716	.0390824	-.1110737	.1026106
6	41	-.0020326	.0333108	-.1208375	.0770631
7	32	-.006219	.0381951	-.1867441	.0958711
8	14	-.0061895	.0436767	-.1355376	.1037777
9	14	-.0070125	.0397091	-.1737404	.0641871
10	5	-.0007238	.0201296	-.0467546	.0341026
11	1	-.0168891	.0285232	-.0710016	.0162384
12	4	-.0162248	.0375169	-.1153441	.040494
13	5	-.0161896	.0319641	-.1108819	.0388476
14	1	-.0265315	.0325003	-.0960102	.006178
15	4	-.0246323	.0362981	-.102255	.0566396
16	3	-.0120912	.0849129	-.1355539	.3599621
17	3	-.0173794	.0448744	-.1894281	.0465355
19	2	-.0035816	.0616421	-.0950382	.2044252
21	1	-.0165166	.0371108	-.1108076	.0223888
24	2	-.0251086	.0262104	-.0942883	.0021104
26	1	.0004562	.0069316	-.0157529	.0111783
28	1	-.0260231	.0282563	-.0918767	-.0030462
34	1	-.0423171	.0430591	-.1006981	.0020268
37	1	-.0186367	.0197994	-.0645756	.027789
57	1	-.0180651	.0217673	-.0775434	.0017862
62	1	-.02138	.0233637	-.0779385	.0164104
63	1	-.044536	.0427848	-.1132305	.0013899
67	1	-.024907	.0250966	-.1082169	.0132108
93	1	-.0454681	.0427313	-.1487894	.0059393
163	1	-.025161	.0249425	-.1130735	.0237691
TOTAL	2978				

Table 23: Regression Analysis for Multiple Issuers

This table provides regression results varying the bonds based on the number of bonds a firm has issued in my sample period. The first column provides results of a firm fixed effects regression on the full sample of 6,465 bonds. The second column provides results of an OLS regression on bonds from firms that issued only one bond over the sample period. Column 3 provides the firm fixed effect results of bonds from firms that issued 1, 2, 3, 4, or 5 bonds over the sample period. The last column provides the firm fixed effects results of bonds from firms that issued more than five bonds over the sample period. The sample period is from January 1, 2003 to December 31, 2011.

VARIABLES	FE Full Sample Liqprem	OLS No Issues = 1 liqprem	FE No Issues<6 liqprem	FE No Issues >5 Liqprem
Time to Maturity	-0.000274***	-0.000355**	-0.000350***	-0.000194
	(0.000103)	(0.000180)	(0.000129)	(0.000166)
Coupon	0.366***	0.560***	0.336***	0.375***
	(0.0656)	(0.0610)	(0.0839)	(0.0988)
Amt Issued	-2.36e-11***	-2.07e-11***	-2.06e-11***	-2.62e-11***
	(3.07e-12)	(4.40e-12)	(4.90e-12)	(3.70e-12)
Senior	0.0270***	0.0288***	0.0264***	0.0297***
	(0.00261)	(0.00291)	(0.00383)	(0.00336)
Subordinate	-0.00113	-0.00283	-0.000612	0.00152
	(0.00302)	(0.00253)	(0.00364)	(0.00573)
Equity	0.0188***	0.0159***	0.0175***	0.0182**
	(0.00434)	(0.00173)	(0.00551)	(0.00810)
Treas Proxy	0.00453	0.0112	-0.0356*	0.0244
	(0.0214)	(0.0259)	(0.0214)	(0.0300)
U.S.		0.000530		
		(0.00205)		
y03	-0.0122**	-0.0216***	-0.00342	-0.0226**
	(0.00534)	(0.00445)	(0.00481)	(0.00909)
y04	-0.0150***	-0.0280***	-0.00860**	-0.0243***
	(0.00488)	(0.00440)	(0.00434)	(0.00885)
y05	-0.0140***	-0.0255***	-0.00783*	-0.0243***
	(0.00470)	(0.00467)	(0.00450)	(0.00872)
y06	-0.0169***	-0.0224***	-0.0120***	-0.0268***
	(0.00464)	(0.00449)	(0.00416)	(0.00879)
y07	-0.00903*	-0.0223***	-0.00263	-0.0196**
	(0.00478)	(0.00434)	(0.00435)	(0.00898)
y09	0.00533	-0.00815*	0.0180***	-0.0130
	(0.00635)	(0.00478)	(0.00425)	(0.0113)
y10	0.00324	-0.00769*	0.0131***	-0.0110
	(0.00568)	(0.00414)	(0.00421)	(0.0106)
y11	0.000538	-0.00141	0.00992**	-0.0143
	(0.00545)	(0.00414)	(0.00440)	(0.0104)
Constant	-0.0251***	-0.0351***	-0.0330***	-0.00850
	(0.00610)	(0.00791)	(0.00816)	(0.0112)
Fixed Effects	S&P Rating	Industry S&P Rating	S&P Rating	S&P Rating
Observations	6,455	1,744	4,673	1,782
R-squared		0.407		
Within R-sq	0.156		0.157	0.179
Between R-sq	0.369		0.358	0.666
Overall R-sq	0.342		0.301	0.313
Number of firms		0.407		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 24: Exchanged Bond Statistics
The following table provides summary statistics on the 1,341 bonds that were exchanged for registered debt that have all information necessary to calculate yield spreads. Exchanged bond identifiers and exchange dates were obtained from Bloomberg. Trade information was obtained from TRACE. Days are calendar days.

|	2003	2004	2005	2006	2007	2008	2009	2010	2011	All Years
Total Number of Bonds	370	299	131	82	119	52	116	131	41	
Days between Rule 144A issue and exchange										
Mean	185.40	174.20	190.26	216.59	212.06	258.50	230.84	218.76	168.88	197.17
Median	175	160	166	191.5	204	245.5	224.50	216	166	179
Standard Deviation	95.51	91.17	114.10	105.98	131.53	111.53	101.12	86.25	54.61	102.49
Min	47	42	50	58	49	49	46	71	68	42
Max	825	858	815	526	1060	475	669	536	322	1060
Days between 144A issue and first trade										
Mean	508.66	266.83	223.44	268.17	246.56	309.27	251.27	232.66	178.68	321.87
Median	503.5	242	180	212	218	317.5	239	228	179	267
Standard Deviation	180.99	191.80	179.68	219.92	188.74	153.93	126.15	93.35	52.83	208.26
Min	90	77	63	62	51	58	49	71	76	49
Max	1870	2284	1513	1582	1456	910	860	560	323	2284
Days between exchange and first trade										
Mean	323.26	92.62	33.18	51.59	34.50	50.77	20.42	13.91	9.80	124.70
Median	326.5	51	8	8.5	12	8	6	7	6	20
Standard Deviation	196.18	186.64	139.86	205.29	142.15	151.29	81.79	28.23	12.99	204.55
Min	1	0	0	0	0	0	0	0	0	0
Max	1701	2117	1355	1332	1236	830	681	226	61	2117

Appendix B: Figures
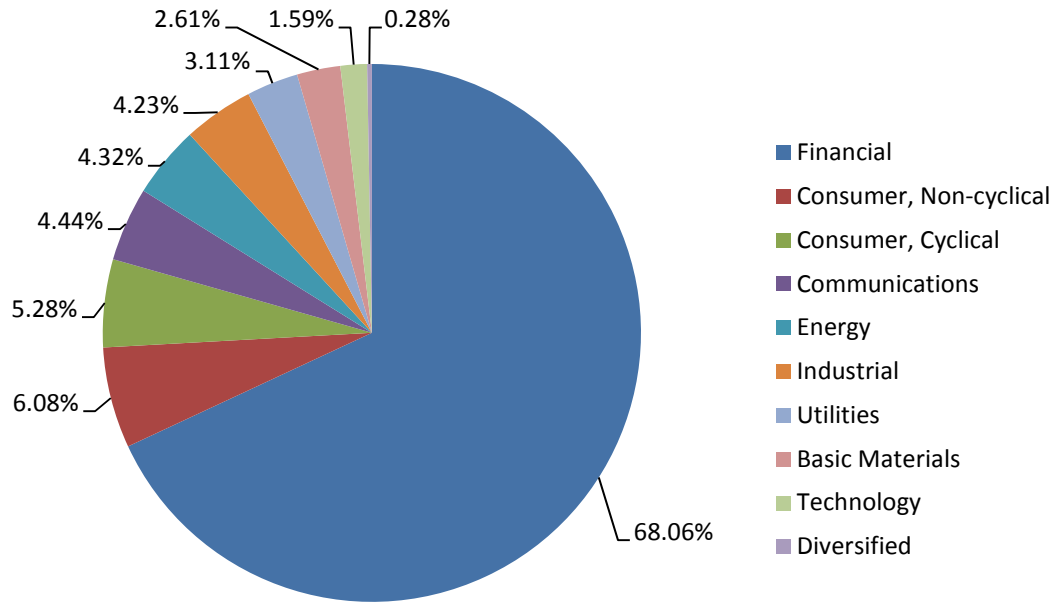
Figure 1: Full Sample Rule 144A Bond Industry Sectors
This figure provides the industry sectors of issuing firms in the Rule 144A market.
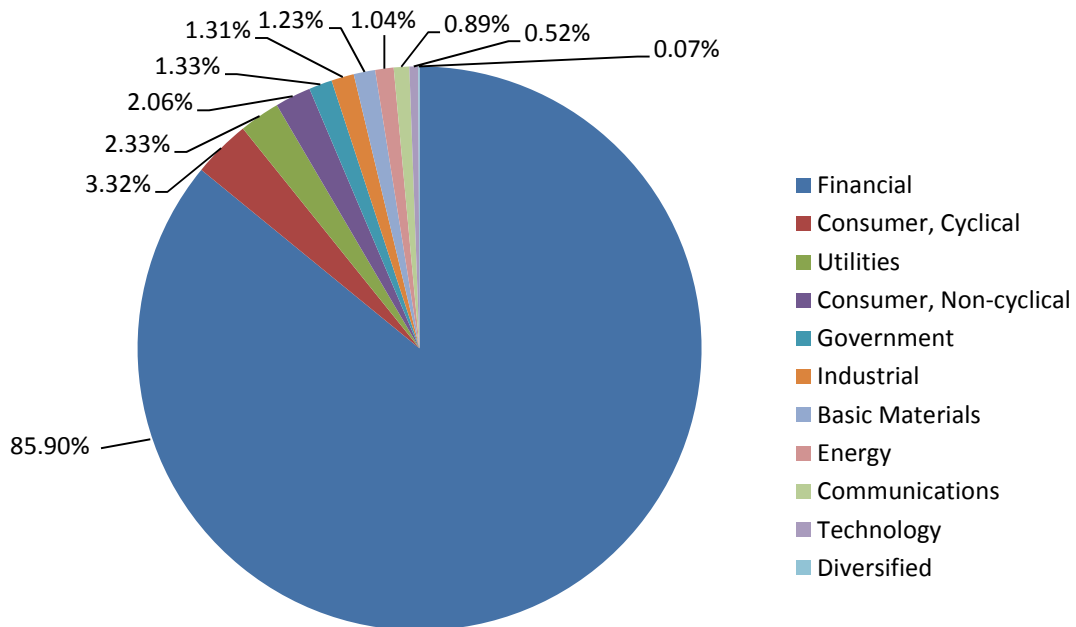

Figure 2: Full Sample Registered Bond Industry Sectors
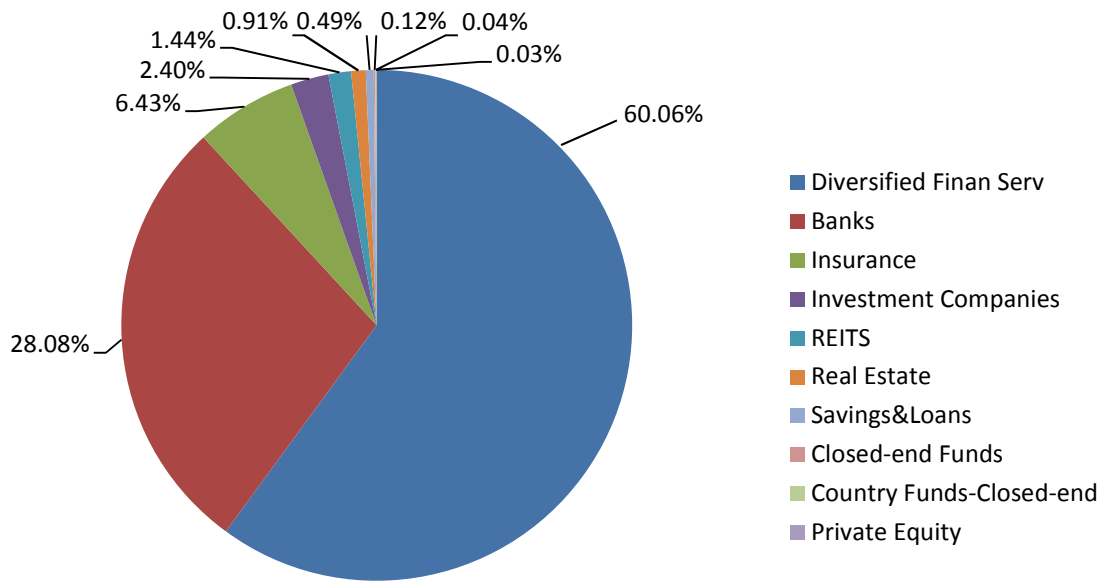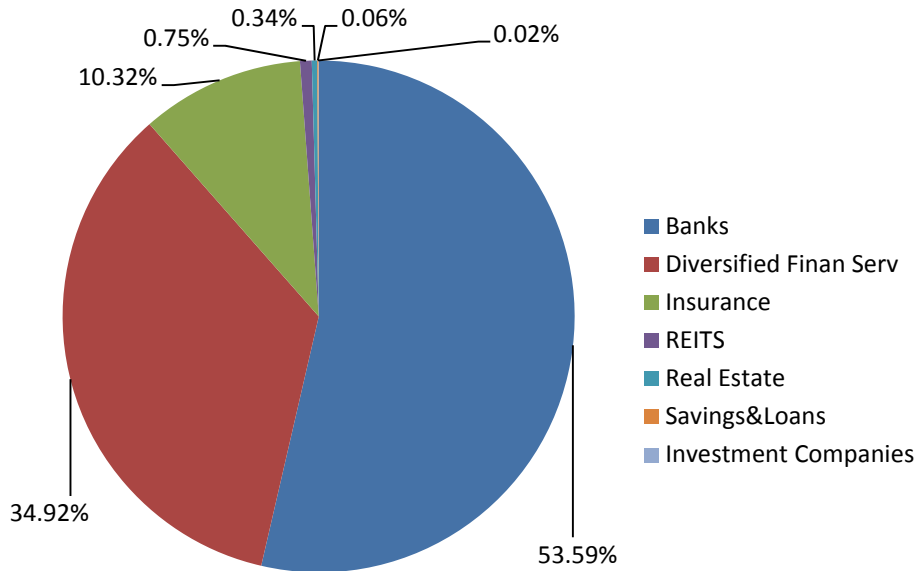This figure provides the industry sectors of issuing firms in the registered bond market.

Figure 3: Full Sample Rule 144A Bond Financial Subsector
This figure provides a breakdown of the financial sector into subsectors of firms issuing bonds in the Rule 144A market.

Figure 4: Full Sample Registered Bond Financial Subsector
This figure provides a breakdown of the financial sector into subsectors of firms issuing bonds in the registered bond market.
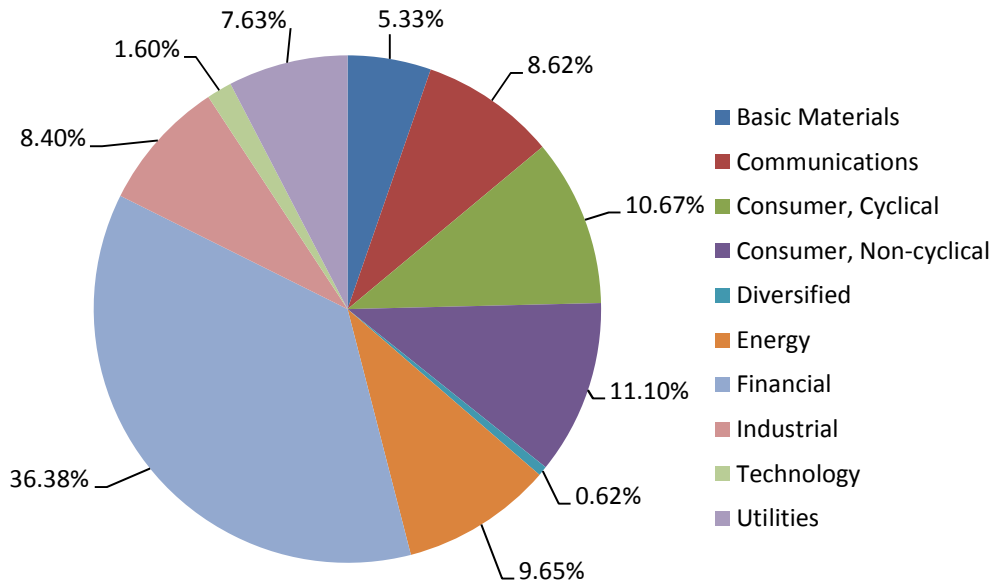
Figure 5: Fixed Coupon Rule 144A Industry Sectors
This figure provides the industry sectors of issuing firms in the Rule 144A market. The data is only for fixed coupon bonds without missing data.
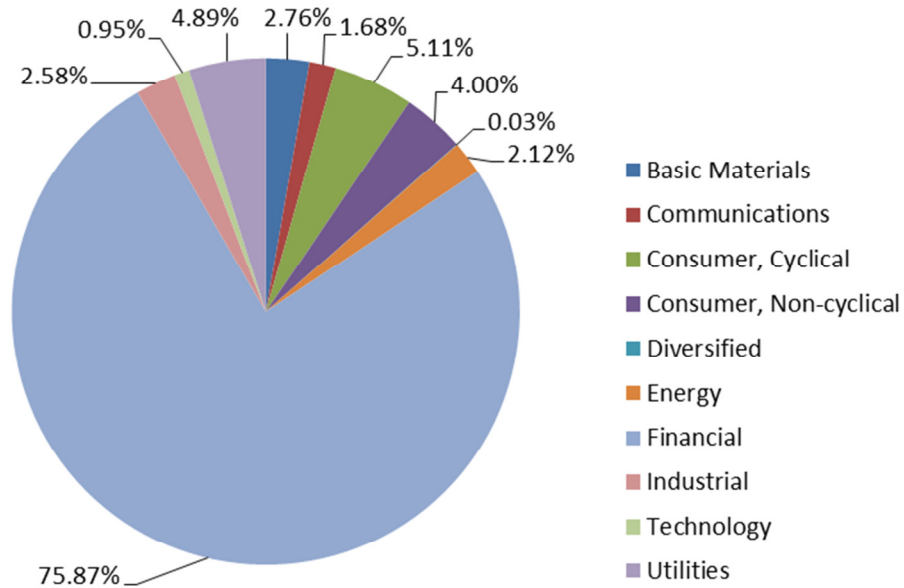

Figure 6: Fixed Coupon Registered Bond Industry Sectors
This figure provides the industry sectors of issuing firms in the registered bond market. The data is only for fixed coupon bonds without missing data.

Vita

Karen Ann Craig was born in Bellefonte, Pennsylvania to the parents of Thomas and Mary L. Craig. She has one older sibling, Amy. She attended three high schools, graduating from Hamden High School in Hamden, Connecticut. After graduating from high school she attended The Pennsylvania State University where she earned a Bachelor of Science degree in Nuclear Engineering in 1993. She continued her education at the University of Missouri earning a Master of Business Administration in 2005. This experience allowed her to reconsider her career and pursue a Ph.D. in Finance. She accepted a graduate teaching assistantship at the University of Tennessee, Knoxville in the Finance Department in the School of Business Administration. Karen will finish her doctoral work in December 2012.

Karen's research interests include corporate finance, fixed income and financial markets and institutions.