PRICING OF INTERNATIONAL PRIVATE DEBT: EVIDENCE FROM THE US 144A SECONDARY BOND MARKET

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Abstract

We study the secondary market pricing of foreign 144A debt issues and assess the unique information role of the implicit market players, known as qualified institutional buyers (QIBs). Using an exhaustive sample of bond issuances and secondary market trades of over 260 international issuers from 40 countries during the period from 1994 to 2010, we find results consistent with the explanation that the presence of QIBs can resolve information asymmetries and hence lower borrowing costs for issuers using this market.

Keywords: international debt markets, non-bank private debt, 144A bonds, Yankee bonds, secondary bond market spreads, QIBs

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1. INTRODUCTION

Debt funding accounts for a significant proportion of corporate capital raising.[1] The non-bank debt issued by foreign corporations in the U.S. is not only sizeable and but has significantly grown over time. Between 1990 and 2010, foreign firms issued $5.6 trillion in U.S. debt markets. Additionally, the ratio of foreign to domestic debt issuance in U.S. has grown from only 6% in 1990 to 40% in 2010 (Source: Fixed Income Securities Database or FISD). Debt by foreign firms is issued in U.S. using either public markets (Yankee debt) or private markets (via bank debt, private placements or Rule 144A debt).[2] Over time, foreign issuers, especially firms located in emerging markets, have expanded the amount of private debt issued. According to FISD data, Rule 144A private debt accounted for 37% of foreign corporate debt issued in the U.S. during 1994 to 2010; and that ratio went up to 65% during 2005-10 period. Relatively the domestic Rule144A issues as a percentage of domestic U.S, corporate debt was 18% during 1994-2010 and went up to 22% during 2005-10.[3] If so, what explains the growth of foreign 144A debt market? What drives the bond pricing in such markets? Is they any special role played by underlying institutions also known as Qualified Institutional Buyers or QIBs?

Despite the significant size and growth of Rule 144A debt market since its inception, very little is known about secondary market pricing, decomposition of implicit risks, and the role of QIB trading in this market. This paper addresses this void by undertaking the first comprehensive study of the *secondary* US bond market trades by all insurance companies of all international issuers over an extended period of time. Previous work has examined the comparative borrowing costs of domestic and foreign firms in the primary debt market (Miller and Puthenpurackal,

[1] For example, Henderson, Jegadeesh, and Weisbach (2006) document that convertible and non-convertible debt together account for 83% (90%) of new domestic (international) corporate capital issues globally from 1990 to 2001.

[2] Yankee bonds are US dollar denominated bonds issued by non-US borrowers to US investors in the public debt market. Private placements refer to instruments issued via statutory exemptions from registration requirements imposed by the Securities Act of 1933 which is administered by the US Securities and Exchange Commission (SEC).

[3] Private issues accounted for 39% (100%) of foreign corporate debt issued by developed (emerging) market firms in US from 1994 to 2010.

2002; Chaplinsky and Ramchand, 2004; Gao, 2011). We add to this literature by studying pricing of foreign debt issues in secondary debt markets. Specifically, we focus on the traded yield spreads of foreign Rule144A issues and compare them to Yankee issues and domestic Rule 144A debt issues by U.S. firms.

An examination of the secondary markets can shed light on the nature and magnitude of risks relevant to investors, as well as the effectiveness of private debt or Rule 144A financing. Since 144A debt is traded, albeit only among QIBs, the improved liquidity, compared to pure private placements, can reduce the discount commonly associated with private placements. This in turn can attract an increasing number of issuers to the private placement market. Active secondary markets help improve underlying transparency, efficiency, liquidity and quality and help lower the borrowing costs for private debt issuers over time. Understanding secondary market pricing behaviour and implicit risks in private debt can also lead to improved mark-to-market valuation of potentially illiquid securities.

In April 1990, the US SEC approved Rule 144A giving issuers a new option to raise debt capital. Rule 144A debt combines features of traditional debt placements without the traditional restrictions on resales:[4] 144A debt is exempt from the registration requirements imposed by the Securities Act of 1933; at the same time, and unlike traditional private placements, resales of Rule 144A securities are permitted, subject to certain qualifications. To qualify, the securities must not be listed on a US securities exchange or quoted on a US automated inter-dealer quotation system and must be resold to QIBs [5]. The ability to resell 144A securities without registration was expected to improve the liquidity of these securities and hence reduce the cost of

[4] There is an additional source of private debt capital for firms referred to as Regulation S (Reg S) where capital raising occurs by placing either equity (Depositary Receipts) or debt issues offshore to non-US investors and does not require SEC registration. Rule 144A and Reg S issues do not trade on the major exchanges. Rule 144A offers trade amongst QIBs on the Private Offerings Retail Trading Automated Linkage (PORTAL) trading system and Reg S issues trade on the Designated Offshore Securities Markets (DOSM) (Aggarwal, Gray, and Singer, 1999).

[5] The QIB market consists of large financial institutions and other accredited investors. The requirements to qualify as a QIB are as follows (Chaplinsky and Ramchand, 2004): 1) an institution (e.g., an insurance or investment company or pension plan) that owns or invests at least $100 million in securities of non-affiliates; 2) a bank or savings and loan (S&L) association that meets condition 1) and also has an audited net worth of at least $25 million; 3) a broker or dealer registered under the Exchange Act, acting for its own account or for that of QIBs that own and invest at least $10 million in securities of non-affiliates; or 4) an entity whose equity holders are all QIBs.

capital to the issuer. Rule 144A was therefore a key innovation for foreign private non-bank debt issuers as they gained access to funding and trading through QIBs without having to meet strict SEC disclosure requirements and implicit regulatory costs (Chaplinsky and Ramchand, 2004).[6]

The 144A regulations permit selective disclosure of information to QIBs (via exemptions from securities disclosure laws, Regulation FD, and other corporate communications), which could reduce information asymmetry and hence firms' cost of capital (Gomes and Phillips, 2012).[7] Essentially, this design implies speedy issuance since no pre-issue registration with the SEC is mandated (Denis and Mihov, 2003; Huang and Ramirez, 2010), provides additional liquidity through active trading among QIBs, and entails lower upfront borrowing costs. The implicit characteristics of Rule 144A make such issues attractive to QIBs (e.g. insurance companies) who have the financial acumen and sophistication to assess the issuer's credit risk and monitor the performance of these securities using covenants and other contractual protections.

Our analyses in this paper speak generally to the question of how secondary market prices are determined in private debt markets and whether markets with QIBs trade differently from public debt markets. Considering the inherent costs and benefits to the foreign issuers of 144A debt, we ask whether secondary market pricing varies between private and public debt markets across firms and over time.

Private placements account for a sizable share of life insurers' fixed income investments. As of year-end 2012, NAIC reports that about 28% of life insurance companies' total bond portfolio, amounting to $726 billion, was invested in private placements.[8] Because of their demand for long-term assets (e.g. bonds), to duration hedge their long-term liabilities, insurance companies

[6] The exemption from SEC registration requirements for 144A debt rests on the rationale that purchasers of privately placed debt are sophisticated investors who have access to professional advice necessary to trade these securities. The lack of investor protection that accompanies the absence of SEC registration means that private placements are purchased by a smaller group of investors and traded in possibly less liquid markets, leading, ceteris paribus, to higher yields. On the other hand, public debt issues are associated with higher disclosure and regulatory costs, which can be significant for foreign issuers.

[7] Rule 144A has facilitated issuances by junk-rated firms similar to how Rule 415 shelf registrations helped growth of investment-grade debt (Fenn, 2000). Rule 144A issues are found to be similar to public (rather than private) debt issues based on underlying firm and risk characteristics (Gomes and Phillips, 2012).

[8] NAIC private placement report dated 04/04/2014.

can hold relatively illiquid assets (e.g. private placements) to maturity, earning additional compensation through higher coupons. Since insurance companies comprise a key subset of all QIBs, NAIC trading data used in this study captures a commensurate sample of QIB trades. Data on all QIB trades in the 144A market is not disclosed by Financial Industry Regulatory Authority (FINRA) and as such is not a part of publicly available TRACE data.

We employ an exhaustive 144A bond sample of secondary market trades by insurance companies, including 561 issues belonging to 267 issuers from 40 different countries from the National Association of Insurance Commissioners (NAIC) from 1994 to 2010 that have matching bond issuer data on Fixed Income Securities database (FISD) and equity data on COMPUSTAT.

We first analyze secondary market pricing differentials between foreign 144A issues (the treatment sample) and a matched Yankee debt control sample (public debt issues in the U.S. by foreign firms), and find that Rule 144A debt trades at higher spreads compared to Yankee issues in the secondary market. Our results control for issue- and issuer-characteristics and aggregate market factors. Additionally, we use a parsimoniously specified bond-spread model which is robustly estimated and adjusted for year-specific fixed effects and issuer-specific clustering effects. We find that foreign Rule 144A debt trades on average 30 bps higher spread than comparable Yankee issues in the secondary market. Furthermore, this secondary market yield premium is significantly higher than the 18 bps mean premium observed in the primary market. These results are robust to control for bond covenants, local country risks, propensity score matching and alternative control sample of matched US domestic public bond issues.

Next, we evaluate several hypotheses related to the source of yield risk premiums for foreign private debt. Our hypotheses and the associated results are designed to examine the role of liquidity and credit risk, country-specific governance risk, and familiarity risk on secondary market pricing of 144A debt. While all risks are significant in pricing foreign bond spreads, illiquidity and default risks have the highest impact followed by familiarity and governance risk measures. Interestingly, we find that each of these risks has a relatively lower impact on spreads of 144A bonds compared to Yankee bonds. These findings provide support for the information

role of QIBs, who are presumed to better monitor firms and resolve information asymmetry, thereby reducing the impact of underlying risks on 144A bonds. We find that the 2007-09 financial crisis significantly increased 144A bond spreads via exacerbation of liquidity and credit risks.

Finally, we examine the role of private information in 144A pricing. Higher levels of order imbalance imply an excess demand and hence lower yields. We find that order imbalance and dealer inventories significantly increase spreads for the foreign 144A bonds compared to the Yankee control sample. These results are consistent with insurance companies, our QIBs, providing price support and liquidity in the 144A market by supplying bonds, when needed, to the rest of the market. We also find that during the crisis, supply of dealer inventories may help attenuate the impact of excessive selling.

Taken together, our results imply that foreign firms issue in the 144A debt market not only to avoid the onerous SEC registration requirements associated with Yankee debt, but perhaps also to benefit from speedy issuance and better information processing in the QIB market, consistent with other primary market findings (Chaplinsky and Ramchand, 2004; Huang and Ramirez, 2010). Given that managers of capital raising firms have discretion over three choice variables (i.e., (a) type of debt securities they issue, (b) location, and (c) timing of their debt issue), our results will help us better understand the optimal decision choices facing managers. To the extent that foreign firms heavily rely on 144A debt as a funding option, our study also sheds light on the effectiveness of the SEC Rule 144A as a viable borrowing option for global firms. Our study can help regulators gain better insights into the relative costs of private versus public debt issues and thereby facilitate a better market design for foreign debt issuances; our findings can assist buy side investors to better process the implicit secondary market risks of foreign debt.

Our analysis and discussion proceeds as follows: Section 2 provides a review of related work; Section 3 presents our key hypotheses; Section 4 describes the data (Appendices A, B, C, and D provide more details on the sample); Section 5 presents the analysis and results; Section 6 evaluates different risk hypotheses; Section 7 studies the impact of financial crisis and private information on 144A spreads; and Section 8 offers our conclusions.

2. BACKGROUND LITERATURE

The objective of this study is to examine secondary market borrowing costs for public versus Rule 144A debt issues of foreign firms in the US market. Our research question is built on two different strands of literature discussed below.

2.1 Domestic versus International Debt Markets

Debt funding comes in various forms depending on the market of issue: (a) publicly issued debt; (b) bank loans; (c) traditional private placement debt (issued to captive institutional investors); and (d) non-bank private debt or, simply, private debt (such as private Eurodollar and Rule 144A debt). Arena (2010) shows that these four resources account for 21%, 57%, 7% and 15%, respectively, of domestic US non-financial long-term debt issues from 1995 to 2003.

Furthermore, from a location perspective, foreign firms (firms domiciled in foreign countries) can issue: foreign bonds, Eurobonds, and global bonds (Resnick, 2012; Miller and Puthenpurackal, 2005). While foreign bonds are issued by foreign firms in local currency (in our case the U.S. dollar) to domestic investors using public or private debt markets, Eurobonds are issued by local or foreign firms to investors in foreign countries and can be denominated in foreign currencies. The London and Luxembourg exchanges dominate this market (Henderson, Jegadeesh, and Weisbach, 2006). Finally, global bonds include domestic and international debt issues, sold simultaneously in multiple markets at the same offer price.

The extant literature examines several issues related to information effects and pricing of international debt. Miller and Puthenpurackal (2005) document positive and significant stock price reactions to the announcement of global bond issuance. They also point to lower costs of borrowing through increased liquidity and lower issuing costs following issuance of global bonds. McBrady and Schill (2007) find evidence of "opportunistic'' motives for foreign currency-denominated borrowing in the foreign debt market. Gao (2011) finds that, post Sarbanes Oxley Act (SOX) of 2002, foreign firms rely less on the US public bond market. Other studies include Resnick (2012) who studies comparative primary market borrowing costs for international and domestic issuers, and Arena and Dewally (2012) who examine the influence of

a firm's geographical location on corporate debt. Gozzi, Levine, Peria, and Schmukler (2013) show international bond issues are larger, of shorter maturity, tend to be denominated in foreign currency, and are more likely to involve fixed interest rate contracts compared to domestic debt issues.

2.2 Non-bank Private (144A) versus Public (Yankee) Debt Markets

Miller and Puthenpurackal (2002) find that better legal protection and more information disclosure increase the price paid by the Yankee bond investors. Previous work has also examined primary 144A debt markets of foreign issuers. Chaplinsky and Ramchand (2004) find that foreign issuers tend to use the 144A market in the case of high yield and nonrated issues. They examine the borrowing costs of foreign firms in the 144A market and find that better quality firms issue in both public and private markets, but face higher spreads in the 144A market; however, low quality firms issue only in the 144A market. Further, Mittoo and Zhang (2010) compare pricing in the primary debt market by US and international firms and find that the yield spreads for emerging versus developed market issuers are significantly higher in the 144A market compared to the public debt market. Huang and Ramirez (2010) explain that the speed of issuance has been the driving force behind the growth in Rule 144A debt. Firms that are cash-starved and have lower credit quality choose the Rule 144A market in order to expedite the issuance of securities.

Other studies examine primary market yield spread differentials between public versus 144A debt issues. Fenn (2000) finds that domestic high-yield issuers use 144A debt to issue securities that are subsequently registered and become fully public in nature. Investors require premiums on 144A securities; such premiums are largest for first-time bond issuers and for less transparent, privately owned firms. However, the study reports that domestic 144A premiums have vanished over time. Livingston and Zhou (2002) report that Rule 144A bond issues have higher issuance yields to maturity than publicly issued debt due to lower liquidity, higher information uncertainty, and weaker legal protection for investors.

Existing studies also report a pecking order within debt issues. Denis and Milhov (2003) analyze the determinants of the choice among public debt, bank debt, and non-bank private (or 144A)

debt for US firms. They find that firms with the highest credit quality exhibit a strong preference for public debt, while firms with credit ratings towards the middle of the spectrum borrow from banks, and those at the bottom of the credit rating spectrum borrow from non-bank private sources. Arena (2010) finds that high credit quality firms prefer public bond offerings and small firms with good credit quality are more likely to issue traditional private debt. A large group of firms characterized by moderate credit quality make extensive use of bank loans and poor credit quality firms preferentially issue 144A debt.

Arena and Howe (2009) examine how governance characteristics are related to the corporate choice between public and private debt, while Barry, Mann, Mihov, and Rodríguez (2008) find that 144A debt issuers were successful market timers, by issuing more debt right before periods of increasing interest rates. Recently, Hollifield, Neklyudov, and Spatt (2013) study pricing (via bid-ask spreads) in securitized markets and compare registered securitizations, which require detailed disclosures in the issuance process, with Rule 144A instruments. The authors find that the customer spreads are relatively smaller for central dealers in Rule 144A than in registered instruments.

3. HYPOTHESES DEVLOPMENT

We next consider three hypotheses about foreign 144A bond spreads based on their pricing drivers.

3.1 Foreign Rule 144A vs. Yankee Secondary Market Bond Spreads

Ceteris paribus, lower liquidity, higher information asymmetry, and weaker legal protection for investors (Livingston and Zhou, 2002) are associated with larger issue spreads for private debt compared to public debt in the primary market. While this holds for domestic (i.e. U.S.) debt, primary market spreads for foreign 144A debt issuers, and particularly those from emerging markets, are also significantly higher compared to Yankee debt. This is mainly due to higher firm risk and poorer credit quality, legal protection, and information disclosure standards (Miller and Puthenpurackal, 2002; Chaplinsky and Ramchand, 2004; Mittoo and Zhang, 2010).

If similar risks persist in secondary markets, 144A bonds will continue to trade at higher yield spreads compared to Yankee debt. On the other hand, the QIB market consists of sophisticated investors who are arguably more qualified to gather and process information. As a result, the QIB market may facilitate better information sharing and lower information asymmetry, thereby attenuating the spread differences between private and Yankee markets. This leads us to test the following hypothesis on secondary bond spread differences.

- **Hypothesis 1**: *Rule 144A debt of foreign issuers has higher spreads compared to Yankee debt in the secondary bond markets.*

3.2 Risks in the Foreign Bond Market

Here we consider different risks that may potentially impact foreign bond spreads for US investors.

3.2.1. Illiquidity and Credit Risks

Higher spreads for Rule 144A debt can arise from higher underlying credit risks, which considers both probability of default and loss given default in present value terms. Compared to publicly traded bonds, private placements tend to be less liquid as information about the issuer, the issue and the financed projects are not publicly disseminated. While private debt constitutes a significant proportion of capital structure of foreign firms, the underlying market remains illiquid as they are not widely traded. Extant studies show that credit risk determinants alone cannot adequately explain the levels or changes in the corporate bond spreads, and non-default sources of risk, such as illiquidity, matter (Collin-Dufresne, Goldstein, and Martin, 2001; Huang and Huang, 2012).[9] Ignoring non-default sources of risk, such as illiquidity, can lead to structural models overpricing bonds and result in the so-called "credit puzzle" (Driessen, 2005; Covitz and Downing, 2007). Extant work also focuses on disentangling credit and liquidity risks from yield spreads.[10]

[9] Liquidity reflects the ability to trade large quantities of a security quickly with minimal trading costs and little price impact.

[10] This includes Longstaff, Mithal, and Neis (2005); Driessen (2005); Covitz and Downing (2007); Beber, Brandt, and Kavajecz (2009); and Schwartz (2010). Acharya, Amihud, and Bharath (2013) document the presence of liquidity regimes in corporate debt markets. Recently Kalimipalli and Nayak (2012) and Kalimipalli, Nayak, and Perez (2013) study the relative pact of idiosyncratic volatility, proxying the ex-ante credit risk and bond liquidity on corporate spreads, and empirically disentangle both the effects.

On one hand, limited liquidity and a predominance of informed traders (QIBs trading mostly for informational reasons), and a lack of noise traders, can exacerbate information asymmetries and lead to higher idiosyncratic volatilities and bond spreads in the QIB market. On the other hand, since QIBs have full access to firms' financials, they are better equipped to monitor and hence resolve information asymmetry, thereby lowering the impact of the underlying credit risk. QIBs can also provide price support and active liquidity, thus lowering the impact of liquidity risks. The net effect of QIB trading on the illiquidity and credit risks affecting bond spreads is therefore an empirical issue.

3.2.2 Governance Risks

Strong corporate governance has been shown to lower the cost of debt financing. Bhojraj and Sengupta (2003) document that governance mechanisms can reduce default risk by mitigating agency costs and by reducing information asymmetry between the firm and the lenders. Cremers, Nair and Wei (2007) show that bondholder governance is important in aligning shareholder and bondholder interests and reducing the credit risk associated with strong shareholder governance. Other work documents the role of family control and ownership (Anderson, Mansi, and Reeb, 2003; Boubakri and Ghouma, 2010) and anti-takeover governance provisions (Klock, Maxwell, and Mansi, 2005) on the cost of debt financing.

In international debt markets, a number of studies suggest that better country governance reduces the cost of borrowing. Miller and Puthenpurackal (2002) document that US investors demand economically significant premiums on bonds issued by firms that are located in countries with poor investor protection and information disclosure. Claessens and Yurtoglu (2013) find that better corporate governance helps emerging market firms by enabling greater access to financing, lower cost of capital, better firm performance, and more favorable treatment of all stakeholders. Lastly, Ball, Hail, and Vasvari (2011) find that cross-listed firms domiciled in countries with a relatively weak regulatory and reporting environment issue bonds more frequently outside the US, while those located in countries that protect lenders well issue more Yankee bonds at a lower cost.

In this paper, we examine if country-wide governance risks can explain the possible yield premium in the 144A debt market.[11] We study the incremental impact of three types of country-level governance variables viz., governance, investor protection and rights, and disclosure on the overall foreign bond market. We test if the presence of QIBs lowers the impact of governance risk. Since private debt issuers provide selective disclosure of information to QIBs, the firms in turn can benefit from lower information asymmetry and cost of capital (Gomes and Phillips, 2012). As secondary market trading of 144A bonds is restricted to the QIB market, this market can arguably better evaluate individual firm's risks independently from the country governance risks, thereby helping resolve information risk.

3.2.3 Familiarity Risks

Familiarity risk is related to investor recognition, which is linked to the number of investors (investor base), based on Merton's (1987) model, which assumes that investors are more likely to invest in firms they know about. This implies that a firm's cost of capital is negatively related to the size of the firm's investor base. Previous studies document a higher visibility and analyst following for non-US firms that raise equity in the US (Baker, Nofsinger, and Weaver, 2002; Foerster and Karolyi, 1999). Foreign debt issuers may bear high familiarity risks, thereby inducing higher secondary market spreads. For instance, both Fenn (2000) and Miller and Puthenpurackal (2002) show that US investors demand premiums on the bonds of first-time foreign issuers. Gao (2011) shows that firms with ADR listing are more likely to issue US public debt as they face lower ex-ante cost of debt. Familiarity risk also manifests through home-bias in international portfolio diversification (Li, 2004).

Familiarity can play an important role in pricing bonds in secondary debt markets. On one hand, 144A bond and ADR markets may be segmented due to the illiquidity and dominance of informed trading via QIBs. On the other hand, foreign firms face higher familiarity risk which could result in lower investor familiarity, thus increasing the risk of investing in the 144A secondary market. For those 144A issuers whose equity is listed as ADRs, QIBs can provide

[11] We focus on country-wide governance variables as firm-level governance variables are hard to access over an extensive global sample such as ours.

even greater monitoring by having joint access to underlying debt and equity.[12] With potential access to both debt and equity capital, QIBs may benefit from improved monitoring, lower agency costs, and reduced information and familiarity risks embedded in private debt.

These risks inform our next set of hypotheses :

- **Hypothesis 2**: *Overall illiquidity, credit, governance and familiarity risks have a positive impact on foreign bond spreads in the secondary market. The presence of QIBs, however, can reduce the impact of these risks, resulting in lower incremental effects of such risks on foreign 144A bonds relative to Yankee control group bonds.*

3.3 Private Information Hypothesis

Finally, we consider the role of private information in the private bond market. Private information can manifest through either each market participant having her own pricing model for underlying risk premia or access to private information in the more traditional sense (e.g., a buy-side investor such as an insurance company hiring an ex-board member of the debt issuer), or both. Alternatively, private information can be measured as order imbalance or dealer inventories.

Order flow measured as order imbalance can be considered an aggregation of heterogeneous private information. Hence, order imbalances can significantly impact asset returns and liquidity. High order imbalances can signal private information, which can reduce liquidity at least temporarily and also move the market price permanently (Kyle, 1985; Chordia, Roll, and Subrahmanyam, 2002). Brandt and Kavajecz (2004) find that order flow imbalances (proxying private information) account for up to 26% of the day-to-day variation in treasury yields on days without major macroeconomic announcements. Beber, Brandt, and Kavajecz (2009) further show that during times of market stress—evidenced by significant private information or high order imbalances—investors chase liquidity, not credit quality.

[12] Chava, Wang and Zhou (2013) show that incentive alignment and enhanced monitoring due to dual ownership can mitigate shareholder-bondholder conflicts.

An alternative measure of order imbalance is the inventories of corporate debt of primary dealers. Dick-Nielsen (2013) shows that corporate bond inventories of primary dealers dropped by over 80% in anticipation of forthcoming Basel III and the Volcker Rule regulations. Depletion in inventories in turn increased the cost of immediacy and magnitude of transaction costs. Randall (2013) shows as long as dealers in OTC markets are risk averse, transaction prices, liquidity provision, and dealers' inventory positions all depend on dealers' inventory holding costs. However, liquidity in the corporate bond market drops when primary dealers become more risk averse relative to customers.

Moreover private information effects as captured by order imbalance and dealer inventories can be exacerbated during financial crisis due to margin spirals and contagion effects. Dealer inventories of corporate bonds may have declined during the 2007-09 crisis arising from asset fire-sales and tighter regulations regarding greater regulatory capital (Brunnermeier, 2009; Krishnamurthy, 2010).

We examine the role of private information on secondary market pricing of foreign debt. While trading among QIBs can exacerbate information asymmetries, QIBs can also provide liquidity to the rest of the market and help mitigate private information shocks. We therefore ask: a) What is the role of private information on underlying 144A foreign bond market risks? b) Did the crisis intensify the private information channel for foreign bond spreads? We test the following hypothesis:

- **Hypothesis 3**: *Private information leads to <u>incrementally</u> higher spreads for 144A debt and more so during the crisis depending on the informational role of QIBs.*

4. DATA AND SUMMARY STATISTICS

We use corporate bond trades of all 144A debt issues for the 17-year period from 1994 through 2010. The bond data is sourced from two complementary sources: the Mergent Fixed Investment Securities Database (FISD) issuance data and the National Association of Insurance Commissioners (NAIC) secondary market pricing database; firm-specific data and equity prices are obtained from COMPUSTAT (for US and Canadian firms) and COMPUSTAT global (for non-Canadian foreign firms). We employ several issue, issuer and transaction-specific variables

along with aggregate market factors and country specific attributes (details in Appendix A). We intersect bond and equity databases to arrive at our final sample. The sample selection procedure is detailed in Appendix B. Our final sample consists of secondary market trades of 561 bond issues for 267 issuers from 40 different countries with an issuing amount of over $325 billion between 1994 and 2010.

[Insert Table 1 here]

Table 1 shows the overall international sample of 144A (Panel A) and Yankee (Panel B) issues from the primary market (sourced from FISD). Private debt comprises 6,151 issues of 1,610 issuers from 76 different countries raising over $2 trillion capital from 1990 to 2001. European issuers account for more than a third of the total Yankee debt issues in the primary market, followed by issuers from Latin America (about 10%) and Asia (6%). There are also significant private debt issues made in offshore (island) venues that are primarily tax havens. Yankee debt (Panel B) is comprised of 20,836 issues, 90% of which are European and Canadian firms. Yankee debt exceeds private debt both in number of issues (3×) and issuance amount (1.7×). Total dollar debt issuance per issue for public (private) debt is on average 17% (33%), highlighting the importance of the private debt market. Appendix C details foreign Yankee and 144A debt issues by country and provides a comparison between international and US debt issues. Firms from UK, France, Netherlands and Canada conduct the bulk of their foreign debt issuance in the US. Domestic issues by US firms still dominate foreign issues in number of issuers and volume and dollar value of issues.

[Insert Figure 1 here]

Figure 1 plots the dollar value and number of debt offerings over time for international and US firms from 1990 to 2010. We find that domestic US firms access debt capital mostly using public debt, while international firms seem to prefer private debt offerings. Private debt issues as a percentage of public debt is substantially higher for international debt and has trended up over time punctuated by crisis-led slowdowns. The dollar volume of private versus public debt issues peaked prior to the high-tech bubble crash in 2000 and witnessed a subsequent growth spurt particularly for international issues. Since 2004, the dollar volume of 144A debt has surpassed

that of Yankee debt every single year, making 144A the most important capital source of debt financing for foreign firms.

[Insert Table 2 here]

Table 2 presents the summary statistics for the 561 private debt issues from the final sample of firms with active secondary market trades (see Appendix B). Over 73% of the traded foreign debt issues belong to European, Asian, and Latin American firms (Panel A). The majority of the issues are senior, unsecured, and non-convertible (Panel B). Straight (callable) bonds account for 55% (43%) of total issues. A further 19% of such issues have issuers with equity listings as depository receipts on the US exchange. Most foreign issuers of traded debt tend to be industrial (55%) followed by financial (36%) firms (Panel C). Panels D and E show that the volume of the 144A bond trades surged in the pre-2007 crisis period and subsequently fell; the yield spreads were high during the post-2000 recession and then went up significantly during the recent crisis period. Appendix D lists the country specific 144A bond issues from FISD for the 40 countries included in the final sample.

[Insert Table 3 here]

Table 3 presents comparisons of the international 144A debt sample with the three control samples: Yankee debt, US private debt, and US public debt. For each international 144A issue-year, we form a control bond observation based on the following criteria: i) the control issue and the treatment issue must have at least one bond transaction during the same year; ii) they must have the same average rounded credit rating using the ratings from the three rating agencies during the year; iii) they must be matched on callability; iv) the control issue should be the most similar, in terms of maturity at transaction time, offer amount, and firm size, to the treatment issue, based on a decile rank for each of these dimensions and measuring the shortest aggregate absolute distance as the closest match. If there are multiple matches from the above procedure, we pick the bond issue that is closest in credit rating then in transaction time. In summary, we form a control sample that is matched on transaction year, current credit rating, callability, remaining bond maturity, firm size and bond issue size.[13]

[13] Duration and maturity record high correlations in excess of 90% in our data. Our untabulated results are found to be robust to matched samples formed based on duration in lieu of maturity.

We observe that on average foreign 144A issuers are better rated and carry stronger interest coverage ratios, but have less liquid secondary market than their domestic counterparts. Foreign 144A issues have a longer vintage than domestic 144A issues implying that foreign firms choose to remain private and hold off on applying for registration rights, possibly with an intention to avoid costs arising from compliance with SEC disclosure requirements and reconciliation to US GAAP standards (Fenn, 2000; Chaplinsky and Ramchand, 2004). The vintage of the foreign 144A sample is about 13 months, implying that our data captures the trading spreads of still on-the-run and non-publicly registered bonds.

We make several observations about foreign 144A yield spreads, obtained using interpolated LIBOR-Swap yield benchmarks, sourced from Datastream. First, and consistent with the literature, the average offering spread for the foreign 144A issues is higher compared to the average spread of the Yankee control sample. Second, foreign 144A transaction spreads in the secondary market are significantly higher compared to spreads in Yankee and US domestic public debt control samples, while being comparable to US domestic 144A spreads. And third, while the transaction spreads are higher compared to initial offering spreads for all samples, the differential between secondary and offering spreads is significantly lower for the foreign and domestic 144As compared to Yankee and US public debt control samples.

5. BASELINE REGRESSION RESULTS *(Hypothesis 1)*

5.1 Baseline Regressions

We first consider baseline panel regressions to examine factors driving the foreign private debt spreads in the secondary market. Possible self-selection in our study arises from the fact that firms with certain unique characteristics are more likely to issue 144A debt. To control for possible endogenity, we use a matched sample: our treatment sample of foreign 144A issues is benchmarked to a control sample of international public (Yankee) issues (details in Section 4 and Table 3). We employ the following parsimonious bond-spread regression specification based on the extant literature:

$$(bond\ spreads)_{i,t} = \alpha + \beta_0 (issue\text{-}characteristics)_{i,t} + \beta_1 (firm\text{-}characteristics_{i,t} + \beta_2 (aggregate\_variables)_{i,t} + \beta_3 (interaction\ variables)_{i,t} + error_{i,t} \quad (1)$$

for a given bond issue *i* at time *t*, where the dependent variable is the secondary market spreads of foreign bond transactions. Regression covariates consist of issue-specific attributes (ratings, maturity, vintage, offer amount, seniority and optionality dummy), issuer-specific characteristics (firm-size, leverage, industry dummy), and aggregate bond market credit and liquidity risk factors (default, term-structure slope, VIX and funding liquidity (or TED) spreads). We employ high yield × rating interaction term to capture the incremental effects of rating changes for low-rated bonds. All the variables (defined in Appendix A) are chosen minimizing possible multicollinearity across variables. In addition, we employ the dummy variable *rule144a*, capturing all foreign 144A issues, as a key variable of interest. We control for year-specific fixed effects and clustering effects by issuer and employ heteroscedasticy adjustments in all regressions. Specification (1) is our baseline regression to evaluate the yield premium on foreign 144A debt benchmarked to Yankee control sample.

[Insert Table 4 here]

Table 4 shows that foreign secondary market bond spreads are significantly positively related to credit risk variables (such as ratings and high-yield debt dummy), maturity, and aggregate market factors, and negatively related to firm size. Low rated non-investment grade bonds carry higher spreads; financial and straight bonds also seem to command yield premium.[14] The 144A dummy variable indicates that spreads for foreign 144A issues are significantly higher compared to the Yankee control sample. We observe that foreign private debt trades at about 30 bps higher spread versus comparable Yankee issues in the secondary market, after controlling for relevant issue- and issuer- specific and aggregate risks. Overall our findings provide evidence in support of Hypothesis 1. Next we evaluate our basic findings by whetting them against several robustness checks.

5.2 Robustness Tests of the Baseline Regressions

[14] Financial and option-free bonds command significantly lower spreads based on (unreported) spearman correlation tables and univariate regressions, though the signs are reversed in Table 4 regressions due to possible multicollinearity.

5.2.1 Effects of Bond Covenants

Prior literature documents the impact of bond covenants on firm value and bond holders' risk (e.g. Chava and Roberts, 2008; Chava, Kumar and Warga, 2009). But it is unclear whether underlying covenants help explain higher 144A issue spreads. Using FISD, we consider three types of bond covenants: (a) bond holder, (b) issuer, and (c) issuer-subsidiary covenants. The bondholder covenant is a dummy variable for the presence of any bondholder protection covenants. The issuer covenant is a dummy variable for the presence of any covenants that restrict the ability of the issuer to indulge in transactions that may be detrimental to the bond holder (e.g., restrictions on mergers, funded debt, and/or dividend payments). The subsidiary covenant is a dummy variable for the presence of any covenants that restrict the issuer's subsidiaries in indulging in possible transactions that may be detrimental to the parent firm's bond holders. We also employ an additional catch-all dummy variable *covenant* that signals if any of the above three covenants exist.

The results shown in Table 3 present univariate comparisons of the bond covenant for the treatment and control samples. We observe that (a) bond holder, (b) issuer, and (c) issuer-subsidiary covenants account for 19%, 10%, and 4% in the 144A international sample, respectively. Overall, 19% of the 144A foreign sample issues have one or more of the three covenants. The distribution of the covenants is quite similar between 144A international and domestic sample. However, the Yankee sample shows a stronger presence of each the covenants listed above with (a), (b) and (c) covenants accounting for 64%, 63% and 41% of the sample issues, respectively. Overall, Yankee and US public debt have significantly more covenants compared to private debt.

[Insert Table 5 here]

Panel A, Table 5, presents baseline regressions from Table 4 augmented by covenant variables as additional controls. Covenants do not seem to significantly drive the bond spreads once controlled for other risk attributes. Hence, the results in Table 4 are robust to the inclusion of bond covenants.

5.2.2 Effects of Local Country Risk

Does local country-specific risk matter in determining the foreign bond spreads? Do higher foreign 144A debt spreads signal a higher country risk premium? We measure country risk by local equity index volatility based on a rolling window of historical 12-month index returns (details in Appendix A). We report baseline regressions augmented with the country volatility measure in Panel A of Table 5. We find that country risk volatility is not significant and evidence for Hypothesis 1 still holds.

5.2.3 Propensity Matched Control Sample

As a second control for endogeneity, we create a matched control sample based on propensity score matching for all foreign 144A issues. The propensity score matching sample approach in our case applies to the selection of foreign firms who have the option of issuing either Yankee or 144A debt.

We design the propensity score matched control sample as follows. We classify all foreign bond issuances by year (except for the first four years of the sample, which we aggregate due to sparseness of issuances in this initial phase). Each year, we implement a probit model for the bond issue type indicator (having a value of one for Rule 144A issues and zero otherwise) on regression covariates consisting of issue-specific variables (maturity, rating, offer amount and callability), issuer-specific variables (finance dummy, firm size and long-term debt ratio), country variable (developed country dummy), and market factors (term and default factors, and VIX value).[15] Using the propensity scores obtained from the probit implementations, for each Rule 144A issue we locate the closest matching Yankee issue in the same year. This matching process yields the propensity score matched control sample. Panel B, Table 5, reports the baseline regression results using the propensity-score matched sample. We find that all the previous results are robust. We observe that foreign 144A debt still trades at a significant yield

[15] Results from probit model are not tabulated for brevity. Overall they indicate that 144A bond issuance is more likely if the issue is lower rated, non-callable, and if the issuer is a financial firm, highly leveraged, and issued during periods of high aggregate default risk.

spread premium of about 30 bps (although the *t*-statistics are somewhat lower) using the propensity matched control sample.[16]

5.2.4 Comparison to Primary market spreads

How do 144A yield spreads in the secondary market compare to those in the primary issuance market? Are there differences in risks being priced between primary and secondary foreign debt markets? Table 5 presents the primary market yield spread regressions for the treatment sample of 144A bonds versus the Yankee sample.

[Insert Table 6 here]

Although the overall explanatory power captured through adjusted R^2s is similar between secondary and primary market regressions, we observe some key differences. Issuing firms seem to set offering yields primarily based on issue characteristics (ratings, maturity, offer amount), as well as aggregate default and liquidity risk factors. Issuer characteristics, term and VIX aggregate risks are not significant in the primary market. Foreign 144A issues offer average yield spreads of about 18 bps (after controlling for risk variables) compared to 30 bps observed in secondary markets.

In summary, the baseline regressions along with various robustness checks confirm the validity of Hypothesis 1. We next turn to evaluating alternative economic explanations behind the differential spreads that we observe in the foreign 144A debt market. We build on the baseline regressions to test each individual hypothesis.

6. TESTS OF COMPETING RISK HYPOTHESES (*Hypotheses 2)*

We next examine Hypotheses 2. We do this sequentially by evaluating each individual risk separately and then combining all risks together.

6.1 Tests of Illiquidity and Credit Risks

[16] As an additional control sample, we consider only those firms that issue both 144A and Yankee debt and repeat Table 4 baseline regressions using such dual issuer firms. The yield premium findings are still robust (results untabulated for brevity) .

We examine the potential impact of liquidity and credit risks on the secondary market pricing of foreign 144A debt, as postulated in Hypothesis 2. We augment baseline regressions with liquidity and credit risk variables using secondary bond market trades for the treatment sample of 144A bonds versus the Yankee control sample.

We consider several liquidity and credit risk proxies based on extant literature and feasibility, considering our data sets (described in Appendix A). Our liquidity proxies consist of three trade-based variables (turnover, trade frequency, and percent of zero-trading days), two bond price-impact variables, and a liquidity factor that is the first principal component of all other liquidity proxies. Similarly, the default proxies include leverage, interest coverage, idiosyncratic volatility, bond spread volatility and the first principal component of all credit proxies (or the credit factor). For parsimony, we consider specifications with two illiquidity risk proxies (the price impact variable and illiquidity factor), two credit risk proxies (spread volatility and credit factor) and a joint illiquidity and credit risk factor (based on the first principal component of all liquidity and credit risk proxies).[17] We employ the liquidity and default risk proxies on both a standalone and interactive basis in Table 7. Interacting liquidity (or default) risk proxy with Rule 144A dummy captures the incremental risk effect for foreign private debt issues.

[Insert Table 7 here]

Table 7 presents baseline regressions from Table 4 augmented with risk variables (for brevity we do not report all variables). Panel A, Table 7, reveals that on a standalone basis both bond credit and liquidity risk proxies positively and significantly bear on bond spreads, with credit factor having a higher loading than liquidity factor. Interacting with the 144A dummy, however, we find that illiquidity and credit risks have significantly negative incremental effects for foreign 144A issuers. This suggests that although illiquidity and credit risk variables load significantly on bond spreads, the incremental effect of such risks is lower for the treatment sample (144A debt) relative to the control group (Yankee debt), thereby providing evidence in support of Hypothesis 2. Despite the fact that our NAIC sample of insurance companies are active in both Yankee and 144A markets, the QIB market for 144As seems to induce lower risk loadings for

[17] We consider each price impact measure separately because of high implicit multicollinearity. Although we report results based on the price impact measure *liq_index,* the second measure *liq_index1* gives similar results, and hence are not tabulated.

illiquidity and credit factors. One possible explanation for this would be improved information sharing in the QIB market.

6.2 Tests of Governance Risks

We examine the potential impact of country specific governance measures on pricing of foreign 144A bonds in the secondary bond markets. The key governance variables include legal system, investor protection, creditor rights, accounting standard index, and the first principal component of these governance variables drawn from multiple databases, as presented in Appendix A. All country specific variables are expected to be negatively related to bond spreads; improvement in each of the measures for a given country indicates an overall improvement in governance which in turn causes local firm bond spreads to decrease.

Panel B, Table 7, reports the results. The legal system is the only variable that is unconditionally significant. The accounting standards (*cifar*) seem to be incrementally significant for 144A debt indicating that better accounting standards can lower secondary market risks for 144A debt. Overall, when governance risk is considered stand alone, there is limited evidence to suggest that improved country governance lowers foreign bond spreads.

6.3 Tests of Familiarity Risk

We next examine the potential impact of familiarity risk on the secondary market pricing of 144A bonds as indicated in Hypothesis 2. Regression covariates include three proxies for familiarity risk all sourced from Bank of New York (BONY) or FISD databases: *dr_existflag* showing whether a US depository receipt (DR) exists for the foreign issuer on or before the particular calendar year of the bond issue; *dr_exchflag* denoting whether the US DR trades in one of the three major exchanges; and *dual_issuer* which assumes a value of one if the underlying firm has issued both Yankee and 144A bonds and zero otherwise. Firms with DRs or firms making both private and Yankee issues are expected to have a lower familiarity risk for investors. Lower risk of dual issuers arises from the fact that their prior Yankee issues must have met mandated SEC requirements.

Panel C, Table 7, reports the results. We observe that US DR dummy *dr_existflag* is significant in all regressions, indicating that familiarity risk is priced in all foreign bonds. Meanwhile, the sign of standalone familiarity variables seems to be reversed suggesting that firms with DRs carry higher spreads, a result that could be driven by implicit multicollinearity from an extensive set of risk controls. To investigate this, in untabulated but otherwise identical settings, we drop all the control variables and find that DR measures load negatively on spreads, a result consistent with the prior primary-market literature.

We further observe that familiarity risks significantly lower incremental effects for foreign 144A issuers, suggesting that foreign private debt issuers with equity listings or those that issue on both public and private US debt markets have lower secondary market spreads. This result is consistent with better information sharing in the QIB market. In untabulated results, we employ a fourth familiarity proxy that identifies all firms with a prior history of DR listings or debt issues. Firms that have previously accessed either equity or debt capital or both will have a greater familiarity. The results are still robust.

In summary, we find evidence validating Hypothesis 2 that familiarity risk has a key role in secondary foreign bond markets; further, such risks are lower for 144A issues implying that QIBs can help mitigate information asymmetry about foreign issuers.

6.4. Joint Tests of all Risks

In panel D of Table 7, we jointly test all three risk hypotheses (illiquidity/credit, governance, and familiarity risks) to examine their combined ability (when nested) to explain the secondary market spreads in the 144A market.

We find that illiquidity, default and governance factors and DR listing dummy all matter individually for foreign 144A spreads. The interaction terms show that the impact of each risk is negative and significant for 144A bonds. While illiquidity/credit and familiarity risks have similar incremental impact on 144A spreads as in previous panels, the effect of governance risk is more pronounced when we employ a governance factor.

The last column of Panel D offers a comparison of economic significance of these risks; we define economic significance of a variable as its standard deviation (or σ) times the absolute value of its coefficient estimate, or the magnitude of change in the dependent variable caused by one standard deviation change in the independent variable. Analysis of the economic significance of risks shows that 1 sigma (or 1σ) shock for liquidity-credit, governance and familiarity risk factors lowers spreads by 25, 16 and 21 bps, respectively, for 144A bonds compared to the Yankee sample. Such magnitudes are considerable given that the secondary-market yield spread difference between Rule 144A bonds and Yankee bonds is about 30 bps. This implies that 1σ liquidity-credit shock causing elevated risk levels results in 71 bps higher spreads for 144A bonds, 25 bps lower compared to Yankee control sample. Similarly, 1σ shock to governance risk, implying improved governance standards, leads to 16 bps lower spreads for 144A bonds, compared to the Yankee benchmark. Finally, 1σ familiarity risk, denoting improved familiarity, lowers 144A spreads by 11 bps, 21 bps lower in comparison to the Yankee cohort. Overall, these results provide evidence consistent with Hypothesis 2. These results are consistent with QIBs being able to better monitor and reduce information asymmetry, thereby lowering the impact of underlying risk of 144A bonds.

6.5 Robustness Tests

6.5.1 Are the Results Robust to Controlling for Financial Crisis?

The recent financial crisis witnessed a drop in collateral values that led to repo-funding problems and consequent risk capital and haircut spirals (Brunnermeier, 2009; Krishnamurthy, 2010). This in turn resulted in fire-sales of corporate bonds and other financial assets causing funding liquidity and contagion effects. The financial crisis also had an impact on underlying liquidity and credit risks and amplified corporate bond spreads (Longstaff, 2010; Dick-Nielsen, Feldhutter, and Lando, 2012; Friewald, Jankowitsch, and Subrahmanyam, 2012; Kalimipalli, Nayak, and Perez, 2013).

We examine the effect of the financial crisis on secondary market spreads and underlying risks. The crisis can amplify credit and liquidity risks; crisis can also lead to elevated risk aversion levels and yield spreads by influencing governance and familiarity risks. We examine if the

presence of QIBs had an impact on incremental risks in the private debt market. Since the 144A market is restricted to QIBs, the incremental outcome depends upon the information role of QIBs. On one hand, we may see strong declines in bond prices if QIBs were also deeply enmeshed in the funding liquidity problems and experienced high risk aversion. On the other hand, if QIBs are able to provide liquidity and price support to the rest of the market, they may help lower the downward price spiral for 144A bonds.[18]

We test if financial crisis can impact bond spreads by influencing the underlying liquidity, credit, governance and familiarity risks in the secondary debt market. Here we consider the baseline regressions augmented with illiquidity, credit, governance and familiarity risks and study the incremental effects of the crisis on the 144A debt market.

[Insert Table 8 here]

Table 8 reports the results. We first observe that in Model (1) the crisis effect for 144A debt (Rule 144A dummy × crisis dummy) is significantly positive, implying that yield spread premium for Rule 144A issues is higher during the crisis period. The incremental effect for each risk (illiquidity-credit, governance and familiarity) for 144A debt (Rule 144A dummy × each risk proxy) remains significantly negative, confirming the improved information sharing in the QIB market. Additionally, conditioning for the crisis, the triple interaction effect for illiquidity-credit risk (i.e. illiquidity-credit risk factor × Rule 144A dummy × crisis dummy) becomes significantly positive, implying that the QIB market experienced significant crisis driven risks. In contrast, for governance and familiarity risks, the triple interaction terms are not significant, implying the net effects of such risks was muted during the crisis. In untabulated results, we also observe that the effect of funding liquidity risk (TED spread) is magnified during the crisis and for 144A spreads.

Overall the financial crisis had a significant impact on secondary market spreads for foreign 144A bonds mainly by influencing the underlying liquidity-credit risks; other risks were unaffected. Further, the incremental effect of each of the risks for 144A debt remains significantly negative during the non-crisis period.

[18] In this paper, we focus on trades of only insurance companies, representing a sub-set of QIBs, as mandated by our NAIC data base. As a result, the final outcome depends upon the trading behavior of insurance companies.

6.5.2 Are the Results Robust to Alternate Control Samples?

Next, we evaluate the robustness of our results by considering two additional control samples matched based on domestic issues of US firms: domestic US 144A issues and domestic US public debt issues. We formulate control samples based on bond and firm sizes, ratings, maturity and call option attributes each year for two types of issuers, as described in Section 4. As before, we implement baseline regressions augmented with different risk variables.

[Insert Table 9 here]

When matched against the domestic 144A control sample (Table 9, Panel A), we find that the foreign 144A bond spreads are not significantly different; there appears to be no significant differences between secondary market pricing of foreign and domestic 144A bond spreads and the foreign 144A issues have no incremental illiquidity, credit, governance or familiarity risks. This implies there is no difference in secondary market pricing between local and foreign 144A issues in the QIB market. Overall, the QIB market seems to generate a favorable information environment thereby lowering information asymmetries for both foreign and domestic debt issues.

However, when the domestic US public debt control sample is used (Panel B), foreign 144A debt commands higher yield spreads which likely result from implicit illiquidity and credit risks, validating Hypotheses 1 and 2. We also observe that the incremental effect of illiquid/credit risk for 144A debt is significantly negative. In summary, our results are consistent with the role of QIBs whose presence can lower information asymmetry in both foreign and domestic private debt. Our findings are consistent with the narrative that the QIB market enables better information sharing and results in a weaker impact of illiquidity and credit risks on foreign 144A debt versus either Yankee or US public bonds.

6.5.3 Are the Results Driven by Emerging Market Risks?

Here we assess if the observed 144A debt yield premium is driven by higher spreads of foreign emerging market firms. We also determine if our evidence supporting earlier hypotheses are robust to conditioning for emerging market bonds.

[Insert Table 10 here]

In regression (1), Table 10, we first determine that, unconditionally, emerging 144 debt trades at higher yield spreads compared to other international 144A debt in the secondary market.[19] However, regressions (3) to (5) show that there is no yield premium on emerging market 144A debt once we control for liquidity-credit, governance, and/or familiarity risks. There is no evidence to indicate that the illiquidity, credit, governance and familiarity risk loadings are incrementally different for emerging markets compared to the rest of the sample. Overall, these results confirm that the favorable impact of the QIB market is agnostic to the emerging or developed state of the market. This improvement of information asymmetry seems to be channeled into the 144A markets regardless of whether bond issuers are from emerging markets or not. While emerging market firms may have higher ex ante risk due to lower governance and transparency measures, private debt for emerging and developed market debt are priced similarly, thanks presumably to the improved information sharing in the QIB market.

7. IMPACT OF PRIVATE INFORMATION *(Hypothesis 3)*

We next examine how private information can impact secondary bond spreads. We consider how private information affects foreign 144A bond spreads and incrementally so during the crisis. Following extant literature, we consider two proxies of private information: order imbalance and dealer inventories.

Order imbalance is defined as the signed trading volume scaled by bond size, averaged across all trades by quarter to accommodate potential sparseness of bond trading. A positive (negative) value of order imbalance indicates net buys (sells) in the market. We calculate this ratio separately for international Rule 144A debt and Yankee debt. Order imbalance plots in Figure 3 show significant declines especially for financial issuers during the recent crisis and also during the economic downturn in the post-2000 tech-crash period, reflecting latent bearish sentiment.

[Insert Figures 3 and 4 here]

[19] In untabulated results, we find that emerging markets 144A debt is issued in the primary market at higher yield spreads compared to domestic 144A debt, consistent with the prior literature (Mittoo and Zhang 2010).

Next we consider corporate debt inventories of primary dealers as another proxy for private information (Randall, 2013; Dick-Nielsen, Feldhutter, and Lando, 2013). Dealer inventory is constructed as a fraction of total interpolated monthly corporate debt outstanding. The weekly dealer inventory data is obtained from FRBNY and the yearly corporate debt outstanding numbers are obtained from FINRA. Linear interpolation is used to obtain the monthly corporate debt outstanding estimates. We also study the crisis-induced impact of aggregate dealer inventories on bond spreads. Figure 4 shows that the corporate debt inventories of primary dealers experience significant increases between 2006 and 2008. Thereafter, at the onset of the crisis, they plummet drastically starting in early 2009. This shows that there were significant outflows of bonds from primary dealers who could have been liquidating their inventories possibly to meet margin calls or other funding needs.

How do order imbalance and inventory channels affect borrowing costs for 144A issuers? To address this we present regression results documenting the differential effects of private information proxies and further condition them for the crisis period.

[Insert Table 11 here]

From Table 11, we observe that overall order imbalance significantly negatively impacts all foreign bonds. Higher levels of order imbalance imply an excess demand and, hence, higher (lower) bond prices (yields). However, conditionally, order imbalance significantly increases spreads for the foreign 144A bonds compared to the Yankee control sample. This is consistent with the explanation the QIBs provide price support and liquidity in the 144A market by supplying bonds when needed by the rest of the market.

We next turn to dealer inventory regressions. The incremental effect of dealer inventory on international 144A bonds is significantly positive in model (3) at a level of 10%, again suggesting possible liquidity provision by QIBs. Finally, there is evidence of a supportive private information channel during the crisis, as shown by the significance of triple interaction effect of dealer inventory × Rule 144A × crisis, albeit at the 10% level. This in turn implies that QIBs may

be providing price support to corporate bonds during the crisis when there was excessive selling.[20]

In summary, we notice that private information, proxied by order imbalance or dealer inventory, leads to incrementally higher spreads on 144A debt; when private information is high, our evidence is consistent with QIBs supplying liquidity and providing price support, thereby moderating the upward pressure on bond prices. During the crisis, supply of dealer inventories may have helped attenuate the impact of excessive selling.

8. CONCLUSIONS

In this paper, we study if and how borrowing costs for international firms may vary across private and public secondary debt markets. International debt issuances in the US have significantly grown over time, particularly for foreign 144A debt. Previous work has examined the comparative borrowing costs of foreign firms in the 144A primary debt markets. We add to the literature by: (a) studying secondary 144A debt markets of international capital issues; and (b) comparing the underlying risks across 144A and Yankee debt. To the best of our knowledge, this is the first comprehensive study of secondary market pricing of foreign 144A debt.

We find that foreign 144A debt spreads in the secondary market are significantly higher compared to Yankee control samples. Such spread differences can be explained by illiquidity, default, country governance and familiarity risks. For the 144A market, the impact of such risks are lower, implying that each of these risks has a relatively smaller impact on spreads of 144A bonds compared to Yankee bonds. No significant spread differences are found between foreign and domestic 144A issues. The emerging market 144A spread premium we notice in the primary market disappears in the secondary market, once again highlighting the information role of QIB market.

Collectively, our findings support the positive information role of QIBs in the 144A market. The ability of QIBs to access firms' financials and their information processing skills arguably enable

[20] Since dealer inventory is based on all US corporate debt, it may be a more aggregate measure compared to bond-specific order imbalance measure.

them to better resolve information asymmetry, thereby mitigating the impact of liquidity, credit, governance and familiarity risks on 144A bond spreads. Possession of private information by QIBs could also translate into price support for the 144A market by supplying bonds when needed by the market and hence tempering the upward pressure on bond prices. Foreign firms, therefore, issue in the 144A debt market to circumvent onerous registration requirements and GAAP reconciliations associated with Yankee debt as well as benefit from speedy issuance and better information processing in the QIB market.

This study utilizes trades made by insurance firms operating in both Yankee and 144A markets. Since insurance companies comprise only a subset of all QIBs, our data does not capture the full sample of QIB trades. Data on all QIB trades in the 144A market is not disclosed by FINRA and is therefore not publicly available in TRACE data. Such data will help address several additional questions: Are there any cross-sectional differences among QIBs with respect to information sharing, risk aversion and trading, and do these differences vary over time? Do heterogeneities in QIB firms impact 144A spreads and benefit foreign 144A debt issuers in relation to the Yankee market? These and other questions are left for future research when more complete QIB trading data becomes available.

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Appendix A. Variable Definitions

This table describes all the variables used in the paper.

Issue-specific characteristics	(Sources: FISD, NAIC, Datastream)
rule144a	A dummy variable that equals one if the bond is a Rule 144A issue.
intrule144a	A dummy variable that equals one if the bond is an international Rule 144A issue.
maturity	Maturity of the bond, in years, either on bond issuance date or on transaction date.
duration	Duration of the bond, in years, either on bond issuance date or on transaction date.
vintage	Bond age, in years from issuance date, on the transaction date.
rating	Average numerical value of credit rating by Moody's, Standard and Poor's, and Fitch on the transaction date (if missing, the nearest credit rating is used). Credit ratings are converted to numerical values using the following coding: AAA = 1, AA = 2, A = 3, BBB = 4, BB = 5, B = 6, CCC = 7, CC = 8, C = 9, DDD and below = 10.
high_yield	A dummy variable that equals one if the issue is a junk bond (BB and below).
offer_amt	Offer (issue) amount of the bond, in millions. In regressions, the variable is transformed into logarithm form for scaling.
offer_cr	First available credit rating of the bond issue, converted to numerical value.
offer_yield	Primary market yield of the bond, in %, on issuance date.
offer_spread	Primary market yield spread of the bond benchmarked to interpolated swap yield, in %, on issuance date.
secured	A dummy variable that equals one if the bond is secured by collateral.
senior	A dummy variable that equals one if the bond has a senior status.
callable	A dummy variable that equals one if the bond is callable.
convertible	A dummy variable that equals one if the bond is convertible.
straight	A dummy variable that equals one if the bond non-convertible, non-callable, and non-putable.
holder_cov	A dummy variable that equals one in the presence of any bondholder covenants that protect the bondholders' rights.
issuer_cov	A dummy variable that equals one in the presence of any issuer covenants that restrict the ability of the issuer from indulging in transactions that may be detrimental to bondholders.
subsid_cov	A dummy variable that equals one in the presence of any subsidiary covenants that restrict the issuer's subsidiaries from indulging in transactions that may be detrimental to parent firm's bondholders.
overall_cov	A dummy variable that equals one if any of the above three covenants (bondholder, issuer, or subsidiary) exists.

Issuer-specific characteristics	(Sources: COMPUSTAT, COMPUSTAT global, FISD)
firm_size	Logarithm of the issuing firm's market capitalization obtained as the product of stock price and shares outstanding.
leverage	Ratio of long-term debt to total book value of assets of the issuing firm.
int_coverage	Pre-tax interest coverage ratio, computed as operating income after depreciation plus interest expense divided by interest expense.
finance	A dummy variable that equals one if the bond issuer is a financial firm.
utility	A dummy variable that equals one if the bond issuer is a utility firm.

Transaction variables	(Sources: NAIC, Datastream)
yield	Secondary market yield of the bond, in %, on transaction date.
spread	Secondary market yield spread of the bond benchmarked to interpolated swap yield, in %, on transaction date (our main dependent variable).

Aggregate market variables	(Source: Datastream)
def	Default factor, obtained as Moody's BAA yield minus 10-year swap rate.
term	Term-structure factor, obtained as 10-year swap rate minus 2-year swap rate.
vix	Equity market volatility factor, obtained as VIX index.
ted	Aggregate liquidity factor, obtained as 30-day LIBOR rate minus 3-month Treasury-Bill rate.

Risk variables

Default risk variables	(Sources: CRSP, NAIC, Datastream)
idios_vol	Idiosyncratic return volatility, computed as standard deviation of residuals from the application of Fama-French 3-factor model on six months of monthly stock returns preceding the transaction date.
spread_vol	Spread volatility, computed as standard deviation of bond yield spreads over the year preceding the transaction date.
credit_fac	Credit risk factor, obtained as first principal component of leverage, int_coverage, idios_vol, and spread_vol.
Liquidity variables	(Sources: NAIC, FISD)
num_trades	Number of bond trades in one year prior to the transaction date.
turnover	Total secondary market trading volume in the year preceding the transaction date standardized by the total amount outstanding of the bond issue.
frac_zeros	Number of non-trading days in the year preceding the transaction date as a fraction of total number of potential trading days.
liq_index	Bond price impact variable, a modified version of Amihud (2002) measure, calculated based on the transaction prices of all trades in one year prior to the transaction date as: $10^8 \times (\sigma_{\text{prices}}) / \text{total volume}$, where σ_{prices} is the standard deviation of transaction prices of all trades and total volume is the dollar volume of all trades in the one-year window prior to the transaction date. Higher price impact values imply lower liquidity (Kalimipali and Nayak, 2012).
liq_index1	Bond price impact variable, a modified version of Amihud (2002) measure, calculated using transaction prices of all trades in one-year prior to transaction date as: $10^8 \times \left(\frac{\text{maximum price} - \text{minimum price}}{\text{average price}} \right) \Big/ \text{total volume}$, where maximum, minimum, and average prices denote the highest, lowest, and mean prices respectively based on all trades, and total volume is the dollar volume of all trades in the one-year window prior to the transaction date. Higher price impact values imply lower liquidity (Kalimipali and Nayak, 2012).
illiq_fac	Illiquidity risk factor, obtained as first principal component of liq_index, liq_index2, num_trades, turnover, and frac_zeros.

Joint liquidity-default risk variable	
illiqcred_fac	First principal component of illiq_fac and credit_fac.
Governance variables	
legsys	Overall score of legal system & property rights; data are from the Economic Freedom Dataset by Fraser Institute.
investor_pr	Index of investor protection; data are from Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008).
crdright	Index of creditor rights for a country; data are from La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998).
cifar	Index of accounting standard of a country; data are from Bushman, Piotroski, and Smith (2004).
gov_fac	Governance risk factor, obtained as first principal component of legsys, investor_pr, crdright, and cifar.
Familiarity variables	(Sources: Bank of New York (BONY), FISD)
dr_existflag	A dummy variable that equals one if a U.S. depository receipt exists for the foreign issuer on or before the calendar year of the bond issue.
dr_exchflag	A dummy variable that equals one if the foreign issuing firm has a U.S. depositary receipt listed in NYSE, NASDAQ or AMEX on or before the calendar year of the bond issue.
dual_issuer	A dummy variable that equals one if the foreign issuer has a history of issuing both 144A and Yankee bonds.
Crisis variable	
crisis	A dummy variable that equals one if the bond transaction occurs during the financial crisis period 2007-2009.

Country characteristics

cntry_eqvol	Country-specific equity return volatility, computed as standard deviation of country-specific monthly stock index returns over the year preceding the transaction date (Source: Datastream).
emerging	A dummy variable that equals one if the country is an emerging market; data is from Standard and Poor's Global Stock Markets Factbooks (2004). The following 15 countries qualify as emerging markets in our sample: Brazil, Chile, China, Colombia, Indonesia, India, Israel, Mexico, Malaysia, Peru, Philippines, Poland, Russia, South Korea, and Thailand.

Private information variables

trade_imb	Order trade imbalance, defined as the signed trading volume scaled by bond outstanding amount, averaged across all trades by quarter, calculated separately for international 144A and Yankee bond issues. A positive (negative) value of order imbalance indicates net buy (net sell) (source: NAIC).
dlr_inven	Weekly corporate debt inventory of primary dealers as a percentage of total corporate debt outstanding; data is from Federal Reserve Bank of New York (FRBNY) and Financial Industry Regulatory Authority (FINRA).

Appendix B. Sample Selection

The following table details the sample selection process for international 144A bonds used in the paper, along with the number of issuing firms and number of bond issues remaining after each screening step.

	# of issues	# of issuers
1. Non-governmental international bonds in FISD	29,550	3,475
2. 144A bonds, 1990-2010	6,151	1,610
3. Require transactions in NAIC, 1994-2010	2,267	1,184
4. Require data availability to calculate yields	1,900	1,019
5. Intersection with Compustat and Compustat Global	729	338
6. Require each bond to be rated and issuer to be a publicly listed firm, 1990-2010	561	267

We obtain non-governmental international bond issues, and issue-specific primary attributes over 1990-2010 period from Mergent FISD database, and corresponding secondary market bond transactions by insurance companies over 1994-2010 period from Mergent NAIC database. A bond is categorized as a 144A issue based on the Rule 144A flag in FISD. Credit ratings issued by Standard & Poor's, Moody's, and Fitch are obtained and converted into numerical values using coding outlined in Appendix A; the average of the credit ratings are assigned as the numerical rating of the bond issue.

Using the clean prices of bond trades and accrued interest from NAIC and other issue-specific attributes, we calculate bond transaction yields. From the NAIC database, we exclude bond trades characterized by any of the following: (a) existing erroneous trade dates; and (b) accrued interest greater than 50% of the par amount or dirty price greater than 50 times of the par amount. We obtain yield spreads for each bond transaction using matching maturity swap rates as benchmark (Houweling, Mentink, and Vorst, 2005). Daily swap rates for 15 different maturities (ranging between 1 and 30 years) are obtained from Datastream. Each bond trade is matched to a corresponding swap rate based on linear interpolation of the two closest neighboring maturity swap yields. Using the computed yields, we also calculate the durations. If the credit rating observation is missing, we then set it to the nearest credit rating, if available. Finally, we exclude bond trades with calculated spreads that are below -10 bps if the bond is investment grade and trades with negative spreads if the bond is a junk bond. All computed bond measures (yields, yield spreads and durations) are further winsorized at the 1% level.

We then intersect the bond transaction panel data with Compustat and Compustat Global to get issuer-specific attributes such as stock price, firm size and accounting data. We employ Compustat for Canadian firms and matching with FISD-NAIC is undertaken using 6-digit CUSIP number. We rely on Compustat Global for all non-Canadian foreign issuers and matching with FISD-NAIC is undertaken primarily by company name based on the degree of textual similarity.

After merging the datasets, we employ the following additional data exclusion filters: (i) all bond transactions that are dated before the bond issuance date, (ii) bond issues that are not rated by any of the three agencies, (iii) bonds by issuers that are not publicly listed firms over the sample period and (iv) variable coupon, asset backed, credit enhanced and sinking fund feature bonds. The final matched dataset consists of issuer-, issue-, and transaction-related information on secondary market bond trades by insurance companies for 144A corporate bond issues by foreign firms with publicly traded equity.

Appendix C. International Public and 144A Primary Market Debt Issues by Country, 1990-2010 (Source: Mergent FISD Database)

	Public Debt			144A Debt		
Country	# of issues	# of issuers	Issuing amt. (bln $)	# of issues	# of issuers	Issuing amt. (bln $)
Anguilla	-	-	-	1	1	0.09
Argentina	82	28	11.86	110	59	15.57
Aruba	1	1	1.50			
Australia	332	59	199.93	353	56	235.81
Austria	55	17	38.33	9	4	3.48
Bahamas	106	8	7.95	17	8	2.61
Bahrain	1	1	0.33	-	-	-
Barbados	-	-	-	3	2	0.65
Belgium	13	9	4.47	14	10	4.77
Bermuda	137	60	65.24	160	45	57.17
Brazil	90	42	145.27	224	119	56.02
British Indian Ocean Territory	1	1	0.35	1	1	0.35
Canada	3,969	367	405.65	341	184	120.92
Cayman Islands	450	101	178.03	1,441	117	189.41
Chile	34	13	8.20	44	23	15.63
China (Peoples Republic of)	16	14	3.44	41	34	11.76
Colombia	6	4	3.27	17	14	6.18
Croatia (Hrvatska)	2	2	0.17	-	-	-
Cyprus	3	2	0.87	2	2	1.10
Czech Republic	1	1	0.35	3	3	0.77
Denmark	23	10	7.98	21	7	20.11
Dominican Republic	1	1	0.20	5	4	1.00
Ecuador	1	1	0.13	2	2	0.25
Egypt	-	-	-	3	1	1.55
El Salvador	-	-	-	1	1	0.20
Estonia	1	1	0.03	-	-	-
Fiji	-	-	-	1	1	0.20
Finland	21	14	8.70	15	8	4.57
France	729	104	476.36	113	40	143.46
Germany	408	100	290.12	64	34	24.25
Greece	11	10	3.18	10	8	1.79
Guatemala	-	-	-	1	1	0.05
Guernsey	12	1	6.20	-	-	-
Hong Kong	15	12	5.36	35	25	13.21
Hungary	1	1	20.00	1	1	0.13
Iceland	5	3	2.15	39	3	17.15
India	6	6	1.89	26	11	10.24
Indonesia	15	11	3.23	27	19	9.95
Ireland	78	30	30.89	138	27	52.07
Isle of Man	2	1	1.00	-	-	-
Israel	12	10	2.07	21	9	6.77
Italy	123	60	51.99	24	13	20.47
Jamaica	-	-	-	2	2	0.28
Japan	41	32	56.01	22	16	19.11
Jordan	1	1	0.04	-	-	-
Kazakhstan	4	4	0.55	27	11	10.13
Korea, Democratic People's Republic (North)	2	1	0.85	-	-	-
Korea, Republic of (South)	64	17	26.21	95	42	37.71
Kuwait	3	2	0.65	-	-	-
Lebanon	5	4	0.36	3	3	0.35
Liberia	17	1	5.90	-	-	-
Lithuania	1	1	0.15	-	-	-
Luxembourg	102	38	70.01	54	27	40.41
Malaysia	4	4	0.98	25	12	10.38
Martinique	-	-	-	1	1	1.50
Mauritius	1	1	1.25	-	-	-
Mexico	102	42	47.57	148	83	54.59

	Public Debt			144A Debt		
Country	# of issues	# of issuers	Issuing amt. (bln $)	# of issues	# of issuers	Issuing amt. (bln $)
Netherlands	2,956	134	467.12	268	92	125.45
Netherlands Antilles	28	11	12.19	5	4	2.21
New Zealand	8	5	26.68	23	4	15.37
Norway	61	17	21.86	22	11	11.84
Pakistan	1	1	0.25	1	1	0.25
Panama	19	5	5.76	59	10	4.90
Peru	4	1	2.29	11	8	3.04
Philippines	21	10	3.93	17	11	3.95
Poland	11	4	2.00	10	4	1.76
Portugal	14	9	7.38	-	-	-
Puerto Rico	15	4	1.96	4	2	1.22
Qatar	-	-	-	15	6	13.80
Romania	1	1	0.13	2	2	0.09
Russian Federation	10	7	3.70	54	20	37.48
Saint Lucia	-	-	-	2	1	0.20
Singapore	281	10	6.99	42	22	24.51
Slovakia	1	1	0.10	1	1	0.20
South Africa	5	5	5.28	4	4	0.73
Spain	59	19	39.93	51	19	50.04
Sri Lanka	1	1	0.10	-	-	-
Swaziland	1	1	0.15	-	-	-
Sweden	87	32	31.33	65	18	54.24
Switzerland	1,683	18	43.55	194	15	29.96
Taiwan (Province of China)	3	3	0.39	25	22	4.37
Thailand	-	-	-	27	15	6.68
Trinidad and Tobago	-	-	-	3	2	1.71
Turkey	-	-	-	8	7	2.49
Ukraine	-	-	-	4	2	0.95
United Arab Emirates	1	1	0.23	18	8	18.64
United Kingdom (Great Britain)	8,322	250	649.21	1,446	154	413.65
United States Minor Outlying Islands	1	1	0.15	-	-	-
Uruguay				2	1	0.20
Venezuela	2	1	0.20	4	2	1.26
Virgin Islands (British)	4	3	0.36	16	13	4.23
Wallis and Futuna Islands				5	1	1.00
Country missing	126	99	18.21	38	34	5.13
Total	20,836	1,908	3,548.58	6,151	1,610	2,065.69
Number of countries	76			76		
United States of America (U.S.)	83,051	6,749	14,619.29	12,509	4,059	3,371.61

Appendix D. Secondary Market Bond Trades of International 144A Debt Issues by Country, 1994-2010 (Sources: Mergent FISD and NAIC Databases)

Country	# of issues	# of issuers	Issuing amt. (bln $)	# of bond trades
Argentina	12	8	2.54	83
Australia	75	26	54.22	2,287
Belgium	2	2	0.95	31
Bermuda	1	1	0.43	6
Brazil	29	21	13.42	411
Canada	56	35	24.19	2,483
Cayman Islands	3	3	0.88	36
Chile	11	8	3.95	265
Colombia	1	1	0.50	58
Denmark	2	1	3.00	29
Finland	6	2	2.16	583
France	22	7	23.84	1,709
Germany	3	3	1.02	39
Hong Kong	9	8	4.50	336
Iceland	15	3	8.63	202
India	16	4	7.81	373
Indonesia	9	4	4.80	57
Ireland	6	2	4.14	188
Italy	6	2	8.00	23
Japan	7	4	3.31	337
Kazakhstan	6	1	2.25	282
Korea, Republic of (South)	25	15	10.75	512
Luxembourg	3	2	3.55	8
Malaysia	9	3	2.97	258
Mexico	42	22	19.53	1,123
Netherlands	13	7	4.69	294
New Zealand	1	1	0.15	17
Norway	12	6	3.98	839
Pakistan	1	1	0.25	6
Peru	2	1	1.05	10
Philippines	3	2	0.67	62
Russian Federation	15	4	10.45	335
Singapore	11	5	7.82	701
Spain	4	3	3.15	18
Sweden	13	6	10.90	821
Switzerland	4	1	0.03	7
Thailand	8	3	2.58	233
United Arab Emirates	10	3	10.14	382
United Kingdom (Great Britain)	85	33	58.83	3,517
Venezuela	1	1	0.26	11
Country missing	2	2	0.39	45
Total	**561**	**267**	**326.65**	**19,017**
BRICs	**60**	**29**	**31.68**	**1,119**

Figure 1. Public and 144A Debt Offerings: International vs. U.S. Issues (Source: Mergent FISD Database)

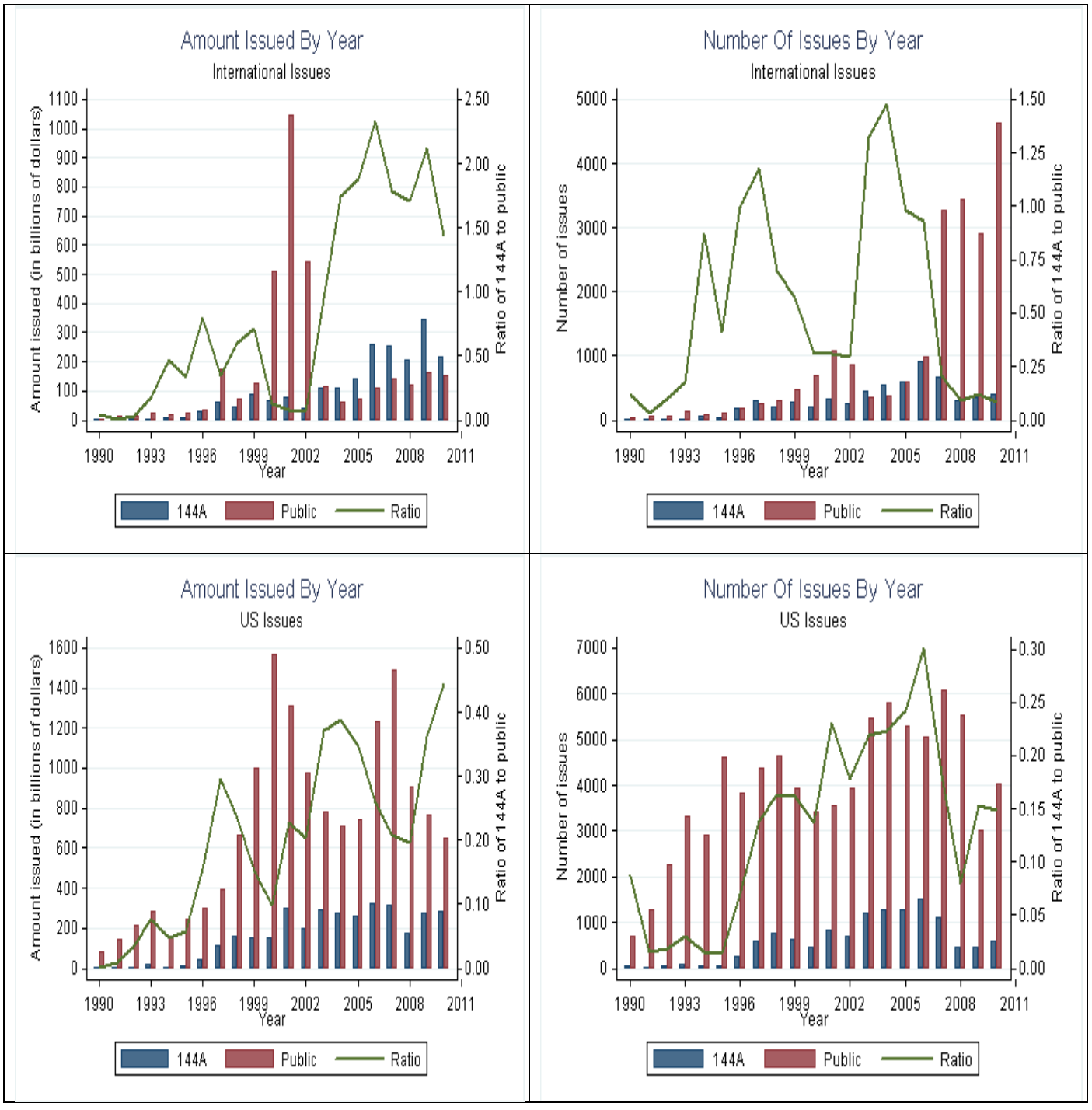

Figure 2. Order Trade Imbalance Levels (Scaled by Outstanding Amounts) for Aggregate Bond Market and by Specific Industry Sectors, 1999-2010 (Sources: Mergent FISD and NAIC Databases)

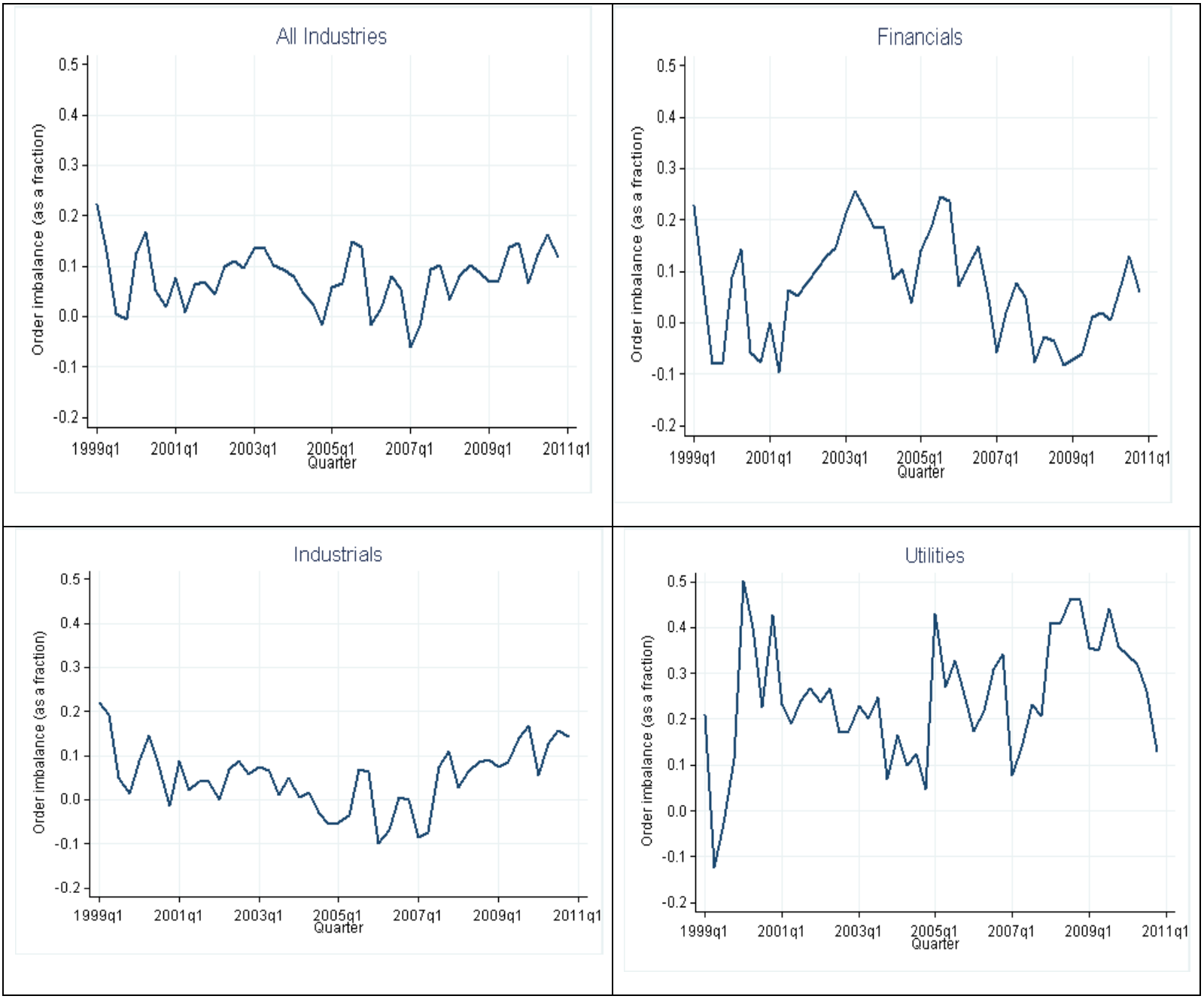

Figure 3. Corporate Debt Inventory of Primary Dealers as a Percentage of Total Corporate Debt Outstanding, 2001-2010 (Sources: FRBNY and FINRA)

Table 1. International 144A Debt Issues: Overall Sample from the FISD Database

This table reports the overall distribution and issue amounts for all international 144A (Panel A) and Yankee (Panel B) debt issues obtained from Mergent FISD database from 1990 through 2010. The region referred to as other includes Bermuda, Cayman Islands and British Virgin Islands.

Panel A: 144A issues

					# of issues from						
Issuing Period	# of issues	# of issuers	# of issuing countries	Amount issued ($ Bn)	Canada	Europe	Asia	Latin America	Australia/ New Zealand	Africa/ Middle East	Other
1990-1993	34	30	13	5	3	6	3	8	1	0	13
1994-1998	808	555	60	150	71	175	130	260	31	17	124
1999-2003	1,534	460	48	382	94	736	61	149	30	16	448
2004-2008	3,031	584	60	968	119	1,420	118	154	138	47	1,035
2009-2010	744	320	47	560	54	288	71	95	182	19	35
Total	6,151	1,610	76	2,066	341	2,625	383	666	382	99	1,655

Panel B: Yankee issues

					# of issues from						
Issuing Period	# of issues	# of issuers	# of issuing countries	Amount issued ($ Bn)	Canada	Europe	Asia	Latin America	Australia/ New Zealand	Africa/ Middle East	Other
1990-1993	276	160	22	55	100	58	12	13	10	1	82
1994-1998	925	541	48	328	320	244	64	141	34	14	108
1999-2003	3,460	1,160	67	2,342	312	2382	71	155	233	30	277
2004-2008	8,646	380	45	511	1504	6689	45	140	39	5	224
2009-2010	7,529	156	31	312	1733	5424	278	42	24	1	27
Total	20,836	1,908	76	3,549	3,969	14,797	470	491	340	51	718

Table 2. International 144A Debt Issues: Summary Statistics for Merged FISD+NAIC+Compustat/Compustat Global Sample

This table reports the distribution, and the primary and secondary market characteristics of international 144A debt issues in the intersection of FISD, NAIC and Compustat/Compustat Global databases from 1994 through 2010. In Panel A, the region referred to as other includes Bermuda, Cayman Islands and British Virgin Islands. In Panel B, all primary market characteristics pertain to observations at the time of issuance or immediately prior to issuance. Panel D is based on the transactions (buy or sell trades) of the international 144A bond issues in NAIC database. All variables are defined in Appendix A.

Panel A: Number of international 144A debt issues in NAIC and Compustat/Compustat Global databases

					# of issues from						
Issuing Period	# of issues	# of issuers	# of issuing countries	Amount. issued ($ Bn)	Canada	Europe	Asia	Latin America	Australia/ New Zealand	Africa/ Middle East	Other
1990-1993	6	6	5	1.09	1	2	1	0	1	0	1
1994-1998	77	53	16	17.66	10	16	29	12	9	0	1
1999-2003	135	92	26	61.58	26	46	22	25	14	2	0
2004-2008	199	110	33	110.91	8	99	30	30	17	12	3
2009-2010	144	78	22	135.42	11	48	16	31	35	2	1
Total	561	267	40	326.65	56	211	98	98	76	16	6

Panel B: Primary market characteristics of international 144A debt issues (561 issues)

	Market equity ($ Bn)	Interest coverage	Leverage	US DR	Offer size ($ Mn)	Maturity	Offer yield (%)	Secured	Senior	Callable	Convertible	Straight
Mean	31.71	12.36	0.24	19.3%	576.06	9.65	6.96	2.1%	94.3%	43.0%	2.5%	54.2%
Median	7.39	2.78	0.22	0	425.00	10.00	6.81	0	1	0	0	1

Panel C: Industry distribution of international 144A debt issues (561 issues)

Total firms	Industrial	Financial	Utility
561	311	202	46
	(55%)	(36%)	(8%)

Panel D: Secondary market characteristics of international 144A debt issues (19,017 transactions)

	Yield (%)	Spread (%)	Maturity	Investment grade	# of trades	Liquidity index
Mean	6.74	2.31	10.03	74.77%	37.18	11.32
Median	6.42	1.68	9.09	100.00%	22.00	1.94

Panel E: Secondary market yields and spreads of international 144A debt issues by time period (19,017 transactions)

Period	N	Yield (%)	Spread (%)
1994-1998	966	8.47	2.15
1999-2003	5,927	7.71	2.39
2004-2008	7,088	6.64	1.97
2009-2010	5,036	5.40	2.73

Table 3. Comparison of Primary and Secondary Market Debt and Firm Characteristics of International 144A Issues versus Three Control Samples

We create three matched control samples to correspond to the treatment sample (international 144A bond issues) transactions: (A) international public (Yankee) bond transactions, (B) US 144A bond transactions, and (C) US public bond transactions. Every transaction year, each treatment sample bond issue is paired with the closest matching control sample bond issue based on transaction year, credit rating, callability, maturity, offer amount and firm size. Specifically, the matched pairs of treatment and control sample bonds need to satisfy the following criteria: (i) both issues have at least one transaction during the chosen year; (ii) both have the same average integer credit rating value (using ratings from three rating agencies during the year); (iii) both have the same callability status; (iv) the control issue is the closest match to the treatment issue in terms of maturity, offer amount and firm size (we compute decile ranks for each of these dimensions and the shortest aggregate absolute distance defines the closest match); and (v) in case of multiple matches, exact credit rating values on the transaction date are used as tie-breaker. We report the average (mean) and standard deviation (std) values of the matching control attributes, and issue, transaction, issuer and covenant related characteristics for the treatment and the three control samples. All variables are defined in Appendix A. Excess transaction spread reflects the difference between secondary market transaction spread and primary market offer spread.

			Control Sample					
	Int'l 144A (N = 19,016)		**Int'l public** (N = 27,921)		**US 144A** (N = 25,829)		**US public** (N = 38,478)	
	mean	std	mean	std	mean	std	mean	std
Control attributes								
offer_amt	750.84	665.59	887.32	855.98	665.35	866.19	772.20	653.79
maturity	10.03	7.14	7.88	5.81	8.63	5.25	8.44	5.74
rating	3.79	1.20	3.63	1.36	4.17	1.05	3.65	1.24
firm_size	21.20	29.10	26.52	32.40	26.84	56.39	34.13	54.38
callable	0.52	0.50	0.54	0.50	0.53	0.50	0.45	0.50
Issue characteristics								
secured	0.01	0.10	0.02	0.14	0.03	0.16	0.01	0.11
senior	0.92	0.27	0.95	0.22	0.94	0.24	0.93	0.25
convertible	0.02	0.13	0.01	0.10	0.06	0.24	0.01	0.08
straight	0.47	0.50	0.45	0.50	0.41	0.49	0.54	0.50
vintage	1.11	1.80	1.89	2.58	0.51	1.10	2.17	2.96
duration	6.32	2.60	5.47	2.38	5.97	2.24	5.84	2.46
offer_cr	3.74	1.19	3.57	1.36	4.28	1.07	3.47	1.24
offer_yield	6.70	1.92	5.63	2.05	6.44	1.94	5.95	1.80
offer_spread	1.95	1.61	1.20	1.11	1.67	1.75	1.15	1.10
Transaction characteristics								
yield	6.74	2.30	5.96	2.57	6.80	2.45	6.15	2.88
spread	2.31	2.01	2.02	2.11	2.28	2.52	2.03	2.61
num_trades	37.18	44.20	45.01	50.17	55.38	79.98	45.77	39.32
liq_index	11.32	31.74	11.47	28.56	7.77	22.47	12.73	33.42
spread_vol	0.55	0.85	0.62	0.89	0.56	0.87	0.67	1.02
Issuer characteristics								
int_coverage	15.24	68.54	5.43	5.93	9.28	11.87	46.38	128.32
leverage	0.26	0.16	0.23	0.15	0.27	0.19	0.25	0.17
dr_existflag	0.09	0.29	0.15	0.36				
Covenant characteristics								
holder_cov	0.19	0.39	0.64	0.48	0.20	0.40	0.80	0.40
issuer_cov	0.10	0.30	0.63	0.48	0.10	0.30	0.78	0.41
subsid_cov	0.04	0.19	0.41	0.49	0.04	0.19	0.50	0.50
overall_cov	0.19	0.40	0.66	0.47	0.20	0.40	0.84	0.37
# of issues	561		481		564		1089	
# of issuers	267		206		369		536	
excess transaction spread	0.36		0.82		0.61		0.88	

Table 4. Baseline Panel Regressions of Secondary Market Bond Spreads for International Debt Issues

This table reports the results of panel regressions involving secondary market trades corresponding to the treatment sample of international 144A bonds and the matched control sample of international public (Yankee) issues. The dependent variable is bond spreads corresponding to the secondary market transactions. Explanatory variables include indicator rule144a (a dummy variable that equals one if the issue is a 144A bond and zero otherwise), issue- and issuer-specific characteristics, and aggregate market variables. All variables are defined in Appendix A. All regressions include controls for year-specific fixed effects and issuer-specific cluster effects, and adjustments for heteroskedasticity. Values of *t*-statistics are reported in parentheses. ***, **, and * indicate significance at 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
rule144a				0.32***	0.27***	0.29***
				(3.77)	(3.22)	(3.61)
Issue characteristics						
rating	0.79***	0.83***	0.82***	0.76***	0.80***	0.80***
	(9.45)	(8.50)	(9.19)	(9.46)	(8.61)	(9.36)
high_yield * rating	0.33***	0.28***	0.29***	0.34***	0.29***	0.30***
	(7.92)	(6.47)	(6.67)	(8.41)	(6.89)	(7.11)
maturity	0.02***	0.02***	0.02***	0.01***	0.02***	0.02***
	(3.51)	(4.48)	(4.28)	(3.08)	(4.17)	(3.91)
vintage	0.02	0.03	0.02	0.03	0.05**	0.04
	(0.80)	(1.44)	(0.92)	(1.49)	(2.03)	(1.54)
offer_amt	0.02	0.11	0.09	0.03	0.12	0.09
	(0.29)	(1.47)	(1.17)	(0.51)	(1.60)	(1.30)
senior	-0.21	0.02	0.11	-0.18	0.05	0.14
	(-1.22)	(0.14)	(0.61)	(-1.02)	(0.27)	(0.73)
straight	0.45***	0.35***	0.39***	0.38***	0.29***	0.32***
	(4.57)	(3.47)	(3.95)	(3.86)	(2.75)	(3.15)
Issuer characteristics						
firm_size		-0.14**	-0.13**		-0.13**	-0.13**
		(-2.34)	(-2.38)		(-2.31)	(-2.33)
leverage		0.51	0.53		0.45	0.46
		(1.24)	(1.29)		(1.13)	(1.17)
finance		0.57***	0.67***		0.55***	0.65***
		(4.07)	(5.27)		(3.89)	(5.10)
utility		0.31	0.25		0.31	0.24
		(1.45)	(1.24)		(1.57)	(1.24)
Market variables						
def			0.61***			0.62***
			(5.38)			(5.47)
term			-0.32***			-0.32***
			(-2.81)			(-2.82)
vix			0.03***			0.03***
			(4.40)			(4.27)
ted			0.36***			0.37***
			(3.22)			(3.27)
Constant	-1.62*	-2.16**	-3.64***	-1.88**	-2.36***	-3.87***
	(-1.73)	(-2.32)	(-3.50)	(-2.03)	(-2.59)	(-3.80)
Year fixed effects	Y	Y	Y	Y	Y	Y
Issuer cluster effects	Y	Y	Y	Y	Y	Y
Observations	36,030	35,450	35,450	36,030	35,450	35,450
Adjusted R-squared	0.502	0.519	0.575	0.506	0.522	0.579

Table 5. Robustness Tests for Regressions of Secondary Market Bond Spreads for International Debt Issues

This table reports two robustness tests for the baseline panel regressions of secondary market bond spreads for international 144A and Yankee issues reported in Table 4. In Panel A, in addition to the original issue- and issuer-specific characteristics and aggregate market variables, we add control for three types of bond covenants and country-specific equity return volatility; the coefficients and *t*-statistics corresponding to the original baseline variables are omitted for brevity. In Panel B, instead of using the attribute-based matched control sample formation outlined in Table 3, we use propensity score matching (PSM) method to create an alternative matched control sample of Yankee bonds corresponding to the treatment sample of 144A. Under PSM method, using the pooled sample of all international debt issues, we implement a probit model where dependent variable is rule144a indicator (equals one if the issue is a 144A bond and zero otherwise) and explanatory variables are the matching control attributes used in Table 3. Using the propensity scores obtained from the probit implementation, on yearly basis we match each 144A issue to the closest Yankee issue. The baseline regression model is repeated for the propensity score matched combined sample and Panel B reports the results. All variables are defined in Appendix A. All regressions include controls for year-specific fixed effects and issuer-specific cluster effects, and adjustments for heteroskedasticity. Values of *t*-statistics are reported in parentheses. ***, **, and * indicate significance at 1, 5, and 10 percent levels, respectively.

Panel A: Control for bond covenants and country-specific equity volatility

	Bond covenants			Equity volatility
	(1)	(2)	(3)	(4)
rule144a	0.31***	0.29***	0.32***	0.26***
	(3.58)	(2.62)	(3.81)	(3.26)
holder_cov	0.04			
	(0.44)			
issuer_cov		0.01		
		(0.05)		
overall_cov			0.07	
			(0.77)	
cntry_eqvol				4.27
				(1.37)
Issue characteristics	Y	Y	Y	Y
Issuer characteristics	Y	Y	Y	Y
Market variables	Y	Y	Y	Y

Panel B: Baseline regressions using propensity score matched sample

	(1)	(2)	(3)	(4)
rule144a	0.44**	0.29**	0.28**	0.30**
	(2.14)	(2.36)	(2.12)	(2.54)
Issue characteristics				
rating		0.91***	0.85***	0.87***
		(8.41)	(8.14)	(8.38)
high_yield * rating		0.32***	0.30***	0.30***
		(7.59)	(7.27)	(7.27)
Maturity		0.01**	0.02***	0.02***
		(2.39)	(3.20)	(4.15)
Vintage		0.07**	0.07**	0.06*
		(2.13)	(2.08)	(1.69)
offer_amt		0.13	0.28**	0.21**
		(1.52)	(2.59)	(2.18)
Senior		-0.16	0.06	0.12
		(-0.80)	(0.29)	(0.54)
straight		0.60***	0.33***	0.38***
		(3.69)	(2.60)	(2.91)
Issuer characteristics				
firm_size			-0.14**	-0.15**
			(-2.18)	(-2.58)
leverage			0.48	0.52
			(1.12)	(1.34)
finance			0.50**	0.63***
			(2.37)	(3.36)
utility			0.38*	0.24
			(1.80)	(1.03)
Market variables				
def				0.41*
				(1.89)
term				-0.52***
				(-4.02)
vix				0.04***
				(2.85)
ted				0.38***
				(3.47)
Constant	1.94***	-3.72***	-4.55***	-5.01***
	(11.25)	(-2.71)	(-3.23)	(-3.81)
Observations	30,152	29,992	28,106	28,106
Adjusted R-squared	0.092	0.455	0.478	0.542

Table 6. Baseline Panel Regressions of Primary Market Bond Spreads for International Debt Issues

This table reports the results of panel regressions involving primary market offerings for the treatment sample of international 144A bonds and the matched control sample of international public (Yankee) issues. The dependent variable is the offering spread in primary market. Explanatory variables include indicator rule144a (a dummy variable that equals one if the issue is a 144A bond and zero otherwise), issue- and issuer-specific characteristics, and aggregate market variables. All variables are defined in Appendix A. All regressions include controls for year-specific fixed effects and issuer-specific cluster effects, and adjustments for heteroskedasticity. Values of *t*-statistics are reported in parentheses. ***, **, and * indicate significance at 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
rule144a				0.27***	0.22*	0.18*
				(2.73)	(1.96)	(1.71)
Issue characteristics						
rating	0.64***	0.65***	0.64***	0.63***	0.63***	0.63***
	(9.61)	(7.92)	(7.49)	(9.29)	(7.74)	(7.26)
high_yield * rating	0.26***	0.25***	0.26***	0.25***	0.24***	0.26***
	(6.98)	(6.37)	(6.70)	(6.70)	(6.22)	(6.60)
maturity	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***
	(3.68)	(3.74)	(4.07)	(3.88)	(3.89)	(4.20)
offer_amt	-0.18***	-0.19***	-0.23***	-0.19***	-0.19***	-0.23***
	(-3.28)	(-3.00)	(-3.64)	(-3.21)	(-2.98)	(-3.59)
senior	-0.02	-0.14	-0.11	-0.03	-0.16	-0.13
	(-0.13)	(-0.88)	(-0.67)	(-0.27)	(-1.04)	(-0.79)
straight	0.21*	0.24**	0.21*	0.18	0.21*	0.18
	(1.95)	(2.05)	(1.75)	(1.63)	(1.80)	(1.55)
Issuer characteristics						
firm_size		0.01	0.01		0.01	0.01
		(0.24)	(0.22)		(0.29)	(0.27)
leverage		0.49	0.47		0.45	0.44
		(1.27)	(1.24)		(1.17)	(1.15)
finance		-0.04	-0.01		-0.07	-0.04
		(-0.27)	(-0.07)		(-0.43)	(-0.21)
utility		-0.01	-0.06		-0.02	-0.07
		(-0.04)	(-0.45)		(-0.12)	(-0.54)
Market variables						
def			0.59***			0.59***
			(3.81)			(3.86)
term			0.03			0.02
			(0.14)			(0.12)
vix			-0.00			-0.00
			(-0.34)			(-0.35)
ted			0.95***			0.91***
			(3.32)			(3.19)
Constant	1.12	1.08	0.15	1.07	1.06	0.15
	(1.39)	(1.04)	(0.14)	(1.27)	(1.01)	(0.13)
Year fixed effects	Y	Y	Y	Y	Y	Y
Issuer cluster effects	Y	Y	Y	Y	Y	Y
Observations	917	803	788	917	803	788
Adjusted R-squared	0.559	0.561	0.598	0.562	0.563	0.599

Table 7. Regressions of Secondary Market International Bond Spreads with Risk Variables

This table reports the results of baseline regressions of Table 4 augmented with variables for illiquidity and credit risks, governance risk, and familiarity risk for the sample of international 144A and matched Yankee debt issues. The dependent variable is bond spreads corresponding to the secondary market transactions. Explanatory variables include indicator rule144a (a dummy variable that equals one if the issue is a 144A bond and zero otherwise), issue- and issuer-specific characteristics, and aggregate market variables. Augmented risk variables include liq_index (illiquidity index), illiq_fac (illiquidity first principal component factor), spread_vol (volatility of yield spreads), credit_fac (credit risk first principal component factor), illiqcred_fac (first principal component of illiq_fac and credit_fac), legsys (legal system score), investor_pr (investor protection index), crdright (creditors right index), cifar (accounting standard index), gov_fac (governance risk first principal component factor), dr_existflag (dummy variable that equals one if a U.S. depository receipt exists for the issuer), dr_exchflag (dummy variable that equals one if the depository receipt is listed in NYSE, AMEX or NASDAQ), dual_issuer (dummy variable that equal one if the issuer has a history of issuing both 144A and Yankee bonds). For brevity, we do not report the coefficients and *t*-statistics corresponding to issue- and issuer-specific characteristics and aggregate market variables. All variables are defined in Appendix A. All regressions include controls for year-specific fixed effects and issuer-specific cluster effects, and adjustments for heteroskedasticity. Values of *t*-statistics are reported in parentheses. ***, **, and * indicate significance at 1, 5, and 10 percent levels, respectively. In Panel D, economic significance (econ_sig) of each explanatory risk variable is obtained as the spread change in basis points arising from a 1σ shock; it is computed as the product of standard deviation of the risk variable times its coefficient estimate in model (4) of the panel.

Panel A: Illiquidity and credit risks

	(1)	(2)	(3)	(4)	(5)
rule144a	0.35***	0.21**	0.53***	0.25***	0.18**
	(3.68)	(2.47)	(5.65)	(3.14)	(2.04)
liq_index	0.02***				
	(6.15)				
liq_index * rule144a	-0.01**				
	(-2.06)				
illiq_fac		0.36***			
		(5.87)			
illiq_fac * rule144a		-0.13*			
		(-1.70)			
spread_vol			1.02***		
			(6.67)		
spread_vol * rule144a			-0.47***		
			(-2.68)		
credit_fac				0.85***	
				(6.95)	
credit_fac * rule144a				-0.16	
				(-1.60)	
illiqcred_fac					0.87***
					(8.29)
illiqcred_fac * rule144a					-0.28**
					(-2.21)

Panel B: Governance risk

	Governance risk proxy				
	legsys	investor_pr	crdright	cifar	gov_fac
	(1)	(2)	(3)	(4)	(5)
rule144a	0.53	0.32	0.33***	2.72**	0.25***
	(1.01)	(1.19)	(2.77)	(2.18)	(3.07)
Governance risk	-0.16**	-0.05	0.04	0.01	-0.06
	(-2.16)	(-1.63)	(0.60)	(0.59)	(-1.05)
Governance risk * rule144a	-0.04	-0.02	-0.04	-0.03**	-0.07
	(-0.61)	(-0.63)	(-0.67)	(-1.97)	(-1.23)

Panel C: Familiarity risk

	Familiarity risk proxy					
	dr_existflag		dr_exchflag		dual_issuer	
	(1)	(2)	(3)	(4)	(5)	(6)
rule144a	0.24***	0.34***	0.30***	0.34***	0.28***	0.43***
	(2.89)	(3.97)	(3.89)	(4.11)	(3.46)	(3.90)
Familiarity risk	0.26**	0.54***	0.24**	0.39***	0.07	0.22
	(2.33)	(3.22)	(2.26)	(2.86)	(0.73)	(1.58)
Familiarity risk * rule144a		-0.42**		-0.33*		-0.29*
		(-2.39)		(-1.77)		(-1.84)

Panel D: Nesting all risks

	(1)	(2)	(3)	(4)	econ_sig (bps)
rule144a	0.16*	0.25***	0.27***	0.22***	
	(1.83)	(3.34)	(3.07)	(2.75)	
Illiquidity and credit risks					
illiqcred_fac	0.88***	0.87***		0.88***	96
	(7.52)	(8.63)		(7.79)	
illiqcred_fac*rule144a	-0.33**	-0.29**		-0.34**	-25
	(-2.38)	(-2.33)		(-2.50)	
Governance risk					
gov_fac	-0.01		-0.05	-0.00	-0.1
	(-0.25)		(-0.87)	(-0.01)	
gov_fac*rule144a	-0.12*		-0.09	-0.14**	-16
	(-1.89)		(-1.53)	(-2.18)	
Familiarity risk					
dr_existflag		0.69***	0.59***	0.74***	32
		(3.11)	(3.22)	(3.04)	
dr_existflag*rule144a		-0.60**	-0.36*	-0.56**	-21
		(-2.50)	(-1.94)	(-2.19)	

Table 8. Effect of Financial Crisis in Regressions of Secondary Market International Bond Spreads

This table reports the results of baseline regressions of Table 4 augmented with the effects of financial crisis for the sample of international 144A and matched Yankee debt issues. The dependent variable is bond spreads for secondary market transactions. Explanatory variables include indicator rule144a (a dummy variable that equals one if the issue is a 144A bond and zero otherwise), issue- and issuer-specific characteristics, aggregate market variables, and indicator variable crisis (a dummy variable that equals one if the bond transaction occurs in years 2007 through 2009 and zero otherwise). For brevity, we do not report the coefficients and *t*-statistics corresponding to issue- and issuer-specific characteristics and aggregate market variables. All variables are defined in Appendix A. All regressions include controls for year-specific fixed effects and issuer-specific cluster effects, and adjustments for heteroskedasticity. Values of *t*-statistics are reported in parentheses. ***, **, and * indicate significance at 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)
rule144a	0.18**	0.06	0.06	0.14
	(2.06)	(0.65)	(0.60)	(1.63)
rule144a * crisis	0.43**	0.32**	0.34**	0.22
	(2.25)	(2.07)	(2.02)	(1.05)
illiqcred_fac		0.89***	0.91***	0.91***
		(8.52)	(7.78)	(8.07)
illiqcred_fac * rule144a		-0.47***	-0.47***	-0.48***
		(-4.51)	(-4.02)	(-4.24)
illiqcred_fac * rule144a * crisis		0.68***	0.70***	0.70***
		(3.79)	(2.81)	(2.88)
gov_fac			-0.02	-0.00
			(-0.28)	(-0.06)
gov_fac * rule144a			-0.13**	-0.14**
			(-2.09)	(-2.30)
gov_fac * rule144a * crisis			0.07	0.06
			(0.82)	(0.69)
dr_existflag				0.75***
				(3.09)
dr_existflag * rule144a				-0.69***
				(-2.67)
dr_existflag * rule144a * crisis				0.31
				(1.06)

Table 9. Regressions of Secondary Market Bond Spreads for International 144A and U.S. Debt Issues

This table reports the results of panel regressions involving secondary market trades of treatment sample of international 144A bonds and two matched U.S. control samples: U.S. 144A issues (Panel A) and U.S. public issues (Panel B). The dependent variable is bond spreads for secondary market transactions. Explanatory variables include issue- and issuer-specific characteristics, aggregate market variables, intrule144a (dummy variable that equals one if the issue is a 144A bond by an international issuer and zero otherwise), illiqcred_fac (illiquidity and credit risk first principal component factor), gov_fac (governance risk first principal component factor) and dual_issuer (dummy variable that equal one if the issuer has a history of issuing both 144A and Yankee bonds). All variables are defined in Appendix A. All regressions include controls for year-specific fixed effects and issuer-specific cluster effects, and adjustments for heteroskedasticity. Values of *t*-statistics are reported in parentheses. ***, **, and * indicate significance at 1, 5, and 10 percent levels, respectively.

Panel A: International 144A and U.S. 144A issues

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rating	0.50***	0.52***	0.47***	0.50***	0.43***	0.45***	0.50***	0.34*
	(3.66)	(3.60)	(3.38)	(3.71)	(2.60)	(2.95)	(3.68)	(1.87)
high_yield * rating	0.28***	0.33***	0.28***	0.28***	0.20***	0.28***	0.28***	0.21***
	(6.68)	(7.61)	(6.61)	(6.78)	(4.05)	(6.40)	(6.81)	(4.08)
Maturity	-0.00	-0.01	-0.00	-0.00	0.01	0.00	-0.00	0.01
	(-0.02)	(-1.01)	(-0.15)	(-0.25)	(1.22)	(0.02)	(-0.24)	(1.45)
Vintage	0.08**	0.08***	0.09***	0.07**	0.03	0.08**	0.07**	0.04
	(2.47)	(2.61)	(2.69)	(2.13)	(0.89)	(2.19)	(2.09)	(1.05)
offer_amt	0.29***	-0.02	0.31***	0.27**	0.39***	0.25**	0.27**	0.40***
	(2.78)	(-0.21)	(2.94)	(2.54)	(3.68)	(2.19)	(2.55)	(3.42)
Senior	0.44*	0.19	0.45**	0.42*	0.28	0.38	0.42*	0.28
	(1.81)	(0.84)	(1.96)	(1.76)	(1.24)	(1.55)	(1.76)	(1.12)
straight	0.09	0.10	0.07	0.07	-0.03	-0.06	0.07	-0.09
	(0.73)	(0.80)	(0.56)	(0.55)	(-0.26)	(-0.40)	(0.60)	(-0.67)
firm size	-0.28***		-0.31***	-0.27***	-0.28***	-0.29***	-0.27***	-0.31***
	(-4.04)		(-4.09)	(-3.94)	(-3.73)	(-3.83)	(-3.94)	(-3.64)
leverage	0.16		0.04	0.18	-1.10**	0.18	0.17	-0.96*
	(0.44)		(0.11)	(0.51)	(-2.19)	(0.44)	(0.50)	(-1.68)
finance	0.55***		0.55**	0.53***	0.28	0.58***	0.53***	0.30
	(2.94)		(2.50)	(2.84)	(1.36)	(2.87)	(2.79)	(1.33)
utility	0.45		0.62*	0.46	0.39	0.47	0.46	0.35
	(1.32)		(1.94)	(1.33)	(1.12)	(1.32)	(1.31)	(0.97)
def	0.87***			0.87***	0.90***	0.89***	0.87***	0.90***
	(4.70)			(4.63)	(4.47)	(4.64)	(4.60)	(4.45)
term	-0.29**			-0.30**	-0.27*	-0.29**	-0.30**	-0.30**
	(-2.10)			(-2.22)	(-1.84)	(-2.14)	(-2.25)	(-2.12)
vix	0.03**			0.03***	0.02*	0.03***	0.03***	0.02**
	(2.55)			(2.64)	(1.87)	(2.64)	(2.64)	(2.07)
ted	0.47**			0.47**	0.37**	0.42*	0.47**	0.32
	(2.27)			(2.28)	(1.99)	(1.82)	(2.28)	(1.58)
intrule144a		0.21*	0.13	0.17	-0.03	0.12	-0.14	-0.51
		(1.73)	(1.03)	(1.48)	(-0.24)	(0.85)	(-0.30)	(-1.23)
illiqcred_fac					0.75***			0.77***
					(4.47)			(4.54)
illiqcred_fac * intrule144a					-0.16			-0.20
					(-0.92)			(-1.09)
gov_fac						0.02		-0.10
						(0.05)		(-0.26)
gov_fac * intrule144a						-0.17		-0.05
						(-0.47)		(-0.13)
dual_issuer							-0.32	-0.44
							(-0.68)	(-0.99)
dual_issuer * intrule144a							0.32	0.46
							(0.68)	(0.99)
Constant	-4.29***	-0.29	-2.08	-4.09***	-4.51***	-3.54**	-3.78**	-3.57**
	(-2.93)	(-0.15)	(-1.29)	(-2.80)	(-2.98)	(-2.14)	(-2.45)	(-2.08)
Observations	31,901	32,416	31,901	31,901	21,102	30,338	31,901	20,023
Adjusted R-squared	0.544	0.452	0.481	0.545	0.581	0.547	0.545	0.582

Panel B: International 144A and U.S. public issues

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rating	0.71***	0.76***	0.72***	0.74***	0.57***	0.71***	0.73***	0.53***
	(8.88)	(9.43)	(8.96)	(9.60)	(7.06)	(8.85)	(9.49)	(6.15)
high_yield * rating	0.29***	0.33***	0.28***	0.29***	0.21***	0.29***	0.29***	0.22***
	(9.11)	(9.96)	(8.84)	(9.37)	(6.68)	(9.33)	(9.14)	(6.76)
maturity	0.01***	0.00	0.01**	0.01**	0.01***	0.01**	0.01**	0.01***
	(2.78)	(0.19)	(2.22)	(2.29)	(2.65)	(2.52)	(2.26)	(2.93)
vintage	0.03*	0.03	0.06***	0.05***	-0.00	0.06***	0.05***	0.00
	(1.74)	(1.47)	(3.14)	(2.77)	(-0.21)	(2.99)	(2.76)	(0.02)
offer_amt	0.21***	0.04	0.24***	0.19**	0.38***	0.20**	0.19**	0.41***
	(2.59)	(0.56)	(3.05)	(2.53)	(5.43)	(2.53)	(2.53)	(5.71)
senior	0.18	-0.23	0.21	0.22	0.18	0.25	0.22	0.24
	(0.99)	(-1.28)	(1.10)	(1.17)	(1.10)	(1.32)	(1.16)	(1.34)
straight	0.45***	0.55***	0.42***	0.42***	0.24**	0.36***	0.41***	0.21*
	(3.96)	(4.23)	(3.58)	(3.75)	(2.44)	(2.92)	(3.63)	(1.96)
firm_size	-0.31***		-0.32***	-0.29***	-0.23***	-0.30***	-0.29***	-0.25***
	(-5.29)		(-5.30)	(-4.93)	(-4.50)	(-4.87)	(-4.93)	(-4.57)
leverage	0.07		0.02	0.14	-0.80***	0.04	0.13	-0.79**
	(0.22)		(0.05)	(0.45)	(-2.60)	(0.10)	(0.42)	(-2.35)
finance	0.73***		0.71***	0.80***	0.51***	0.85***	0.80***	0.53***
	(5.56)		(5.28)	(6.12)	(3.52)	(6.31)	(6.14)	(3.52)
utility	-0.14		-0.09	-0.13	-0.20	-0.14	-0.14	-0.24
	(-0.65)		(-0.42)	(-0.70)	(-1.21)	(-0.70)	(-0.76)	(-1.42)
def	0.49***			0.52***	0.51***	0.52***	0.52***	0.50***
	(5.22)			(5.71)	(5.62)	(5.76)	(5.63)	(5.48)
term	-0.31***			-0.32***	-0.22**	-0.32***	-0.31***	-0.24**
	(-2.93)			(-3.08)	(-2.26)	(-3.11)	(-3.03)	(-2.47)
vix	0.04***			0.04***	0.03***	0.04***	0.04***	0.03***
	(4.58)			(4.40)	(3.26)	(4.33)	(4.41)	(3.28)
ted	0.28***			0.28***	0.13	0.22**	0.28***	0.09
	(2.62)			(2.59)	(1.14)	(1.97)	(2.60)	(0.74)
intrule144a		0.41***	0.41***	0.43***	0.19**	0.42***	0.48***	0.22*
		(4.38)	(4.87)	(5.34)	(2.37)	(5.12)	(4.10)	(1.80)
illiqcred_fac					0.90***			0.91***
					(9.65)			(9.87)
illiqcred_fac * intrule144a					-0.29**			-0.33**
					(-2.18)			(-2.43)
gov_fac						0.20		0.20
						(0.92)		(0.95)
gov_fac * intrule144a						-0.30		-0.31
						(-1.39)		(-1.42)
dual_issuer							0.01	-0.08
							(0.12)	(-0.83)
dual_issuer * intrule144a							-0.09	-0.03
							(-0.57)	(-0.18)
Constant	-3.28***	-1.93**	-2.21**	-3.53***	-5.10***	-3.35***	-3.53***	-5.13***
	(-3.34)	(-1.99)	(-2.49)	(-3.83)	(-5.58)	(-3.53)	(-3.82)	(-5.38)
Observations	49,673	50,364	49,673	49,673	37,179	47,985	49,673	35,991
Adjusted R-squared	0.544	0.472	0.507	0.551	0.623	0.550	0.551	0.623

Table 10. Emerging Markets Effects in Regressions of Secondary Market International Bond Spreads

This table reports the results of baseline regressions of Table 4 augmented with emerging markets effects for the sample of international 144A and matched Yankee debt issues. The dependent variable is bond spreads for secondary market transactions. Explanatory variables include indicator rule144a (a dummy variable that equals one if the issue is a 144A bond and zero otherwise), issue- and issuer-specific characteristics, aggregate market variables, and indicator variable emerging (a dummy variable that equals one if the issue is by an issuing firm from an emerging market country and zero otherwise). For brevity, we do not report the coefficients and *t*-statistics corresponding to issue- and issuer-specific characteristics and aggregate market variables. All variables are defined in Appendix A. All regressions include controls for year-specific fixed effects and issuer-specific cluster effects, and adjustments for heteroskedasticity. Values of *t*-statistics are reported in parentheses. ***, **, and * indicate significance at 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)
rule144a	0.21***	0.11	0.16	0.21**	0.22**
	(2.60)	(1.22)	(1.44)	(2.35)	(2.47)
rule144a * emerging	0.43***	0.42**	0.20	0.09	0.19
	(2.85)	(2.51)	(0.68)	(0.31)	(0.65)
illiqcred_fac		0.87***	0.89***	0.88***	0.88***
		(8.34)	(7.58)	(7.82)	(7.82)
illiqcred_fac * rule144a		-0.30**	-0.35**	-0.34**	-0.36**
		(-2.19)	(-2.30)	(-2.43)	(-2.35)
illiqcred_fac * rule144a * emerging		0.03	0.09		0.07
		(0.24)	(0.56)		(0.48)
gov_fac			-0.01	0.00	-0.00
			(-0.25)	(0.01)	(-0.01)
gov_fac*rule144a			-0.13	-0.12	-0.15*
			(-1.62)	(-1.63)	(-1.73)
gov_fac * rule144a * emerging			0.08		0.08
			(0.68)		(0.67)
dr_existflag				0.74***	0.74***
				(3.04)	(3.06)
dr_existflag * rule144a				-0.57**	-0.57**
				(-2.16)	(-2.12)
dr_existflag * rule144a * emerging					-0.00
					(-0.01)

Table 11. Effects of Trade Order Imbalance and Primary Dealer Inventories in Regressions of Secondary Market International Bond Spreads: A Test of Private Information Hypothesis

This table reports the results of baseline regressions of Table 4 augmented with two measures of private information for the sample of international 144A and matched Yankee debt issues. The dependent variable is bond spreads for secondary market transactions. Explanatory variables include indicator rule144a (a dummy variable that equals one if the issue is a 144A bond and zero otherwise), issue- and issuer-specific characteristics, aggregate market variables, indicator variable crisis (a dummy variable that equals one if the bond transaction occurs in years 2007 through 2009 and zero otherwise), and private information measure privinfo (proxied by trade order imbalance values and primary dealer inventory levels). For brevity, we do not report the coefficients and *t*-statistics corresponding to issue- and issuer-specific characteristics and aggregate market variables. All variables are defined in Appendix A. All regressions include controls for year-specific fixed effects and issuer-specific cluster effects, and adjustments for heteroskedasticity. Values of *t*-statistics are reported in parentheses. ***, **, and * indicate significance at 1, 5, and 10 percent levels, respectively.

	Private information measure					
	Trade order imbalance			Primary dealer inventory level		
	(1)	(2)	(3)	(1)	(2)	(3)
rule144a	0.19**	0.12	0.12	0.13	-0.12	-0.46
	(2.05)	(1.26)	(1.28)	(1.24)	(-0.42)	(-1.28)
rule144a * crisis	0.43**	0.42**	0.40**	0.48**	0.45**	1.23**
	(2.22)	(2.19)	(2.05)	(2.50)	(2.23)	(2.32)
privinfo	-0.02	-0.70*	-0.70*	-4.80	-9.85	-8.77
	(-0.12)	(-1.82)	(-1.84)	(-0.34)	(-0.64)	(-0.58)
privinfo * rule144a		0.68**	0.67**		10.83	25.08*
		(2.05)	(2.04)		(1.01)	(1.89)
privinfo * rule144a * crisis			0.13			-30.79*
			(0.24)			(-1.93)