DETERMINANTS OF YANKEE BOND PRICING

by

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ABSTRACT

JEFFREY MICHAEL LYON. Determinants of Yankee Bond Pricing. (Under the direction of DR. TAO-HSIEN "DOLLY" KING)

Yankee bonds provide a unique arena to analyze corporate debt issuance due to the fact issuers from a variety of countries are selling bonds within the same market. Previous studies use Yankee bonds to analyze the impact of differing levels of investor protection across countries on the yields and design of corporate debt. This study provides the first attempt to disentangle the impacts of sovereign credit and liquidity risks on Yankee bond yields, and to assess the influence of trading activity of institutional investors on these yields. Based on a sample of 405 Yankee bonds issued between 2002 and 2014 by corporations from 16 countries, sovereign credit risk plays a major determinant of Yankee bond yields. In addition, liquidity risk has a significant impact on Yankee debt yields when sovereign credit risk is high. Institutional trading activity offers additional power of the pricing of these bonds.

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CHAPTER 1: INTRODUCTION

Foreign companies that wish to issue corporate debt in the United States have two options: they can either issue debt in the public Yankee bond market, or they can issue in the Rule 144A private placement bond market. The Yankee bond market is more attractive for issuers because it has a larger number of investors. Companies that issue in the Rule 144A market, therefore, tend to be smaller and riskier than those that issue public debt. Issuances in the Yankee bond market are subject to more regulations and are regulated by the Securities and Exchange Commission (SEC). The Rule 144A issuers are not required to register with the SEC and thus are subject to less regulation.

Yankee bonds give researchers a unique opportunity to test hypotheses because the variety of domiciles of issuers within the same market provides an ideal environment to measure country level effects. One question is the impact of institutional transactions on Yankee bond yields. The majority of research on institutional investors and security pricing at issuance has focused on either primary or secondary equity issuances (e.g. Chemmanur, He, and Hu, 2009, or Chemmanur, Hu, and Huang, 2010). Much of this research has focused on the underpricing of securities via analysis of subsequent returns.

Prior research has shown a significant underpricing of IPOs in equity markets (e.g. see Ibbotson, 1975, and Ritter, 1984). One way of mitigating this underpricing is for institutional traders, or block traders, to create information within a market through their transactions (e.g. Easley and O'Hara, 1987, Koski and Michaely, 2000, or Boehmer and Kelley, 2009). This underpricing relationship has also been shown to occur in the corporate bond market (Cai, Helwege, and Warga, 2007). However, the impact of institutional trading on the yields of corporate bond issues has yet to be investigated.

One complication with transferring the typical methodology of analyzing stocks to the bond market is that bonds have multiple issues of debt compared to a single, liquid stock. We are interested in determining the impact of our variables of interest on the yield spread of a bond at the origination date. With a seasoned equity offering (SEO), one can simply look at how investors are trading issues of the stock prior to the SEO. This is not feasible with a particular issue of debt. We sidestep this issue by examining the trading behavior of institutional investors of prior issues of Yankee debt from the same issuer. Institutional investors purchasing significant amounts of debt from an issuer prior to a new issue is analogous to purchasing shares of the stock prior to an SEO, facilitating a measure of any information to the market regarding the quality of the issue.

The analysis is duplicated for the secondary market transactions of the Yankee bonds in the sample. Ellul, Jotikasthira, and Lundblad (2011) show that insurance companies, which are subject to regulatory constraints, may be forced to sell a bond following a downgrade. The lack of counterparties for such sales often forces the insurance companies to sell bonds at a steep discount. This indicates that institutional transaction activity can have significant predictive power on the yield of Yankee bonds within the secondary market. The empirical results show that net institutional purchasing activity is a strong predictor of Yankee bond yields in both the primary and secondary market.

The impact of sovereign level factors on Yankee bond yield spreads are also examined. It has been shown that sovereign yields have an impact on both the level of corporate yieldsand the associated spreads above default-free securities. For example, Almeida, Cunha, Ferreira, and Restrepo (2017) provide evidence that a sovereign credit

downgrade has a direct impact on the yields of corporate debt so long as the corporate debt has a credit rating at least as high as the country within which it is domiciled. This analysis is extended by examining the relationship between the sovereign credit rating and the yield demanded by investors in both the primary and secondary markets. The empirical results indicate that investors strongly consider the credit rating of the sovereign entity from which a Yankee bond issuer is domiciled when pricing the Yankee bond.

There is also evidence linking sovereign credit risk to the banking sector within a country (see, for example, Bolton and Jeanne, 2011, and Gennaioli, Martin, and Rossi, 2010). There is also a possibility of a banking crisis being caused by a shortage of liquidity within a country (Diamond and Rajan, 2005). Further, a banking crisis within a country can adversely impact firms within that country reliant on borrowing from the banking sector within that country (Chava and Purnanandam, 2011). Are investors warier of firms that issue debt from areas more likely to suffer a banking crisis due to liquidity constraints? The empirical results indicate that they are, although the relationship is weak.

This study contributes to the literature in four ways. First, it adds to the literature examining the relevance of the factors outside of default risk of a corporation in the determination of the corporate yield spread. Second, it provides additional evidence that sovereign credit risk has a significant impact on the yields of corporate debt. Third, it documents the potential information generated from institutional investor transactions within the bond market. Fourth, it provides some evidence that investors are wary of any potential liquidity crisis within a country and its impact on a corporation's ability to borrow and repay its debt.

CHAPTER TWO: LITERATURE REVIEW AND HYPOTHESIS

Much of the previous literature on Yankee bonds has focused on utilizing the homogenous market of investors and heterogeneous set of issuers to investigate the impact of sovereign-level investor protection on yield spreads and covenant choices. For example, Miller and Reisel (2011) and Qi, Roth, and Wald (2011) explore the trade-off between country level investor rights and the covenants attached to an individual bond. Liu (2010) explores the benefits of investing in Yankee bonds for U.S. investors. Huang et al. (2013) provides an in-depth discussion of Rule 144A issuers and how they compare to Yankee bond issuers. Chaplinsky and Ramchand (2004) looks at the borrowing costs of firms in the Rule 144A market. Ahearne et al. (2004) utilizes the fact that Yankee bond and foreign U.S. equity issuers are subject to greater regulation and reduced information costs for investors to measure the home bias of U.S. investors. Batten, Fetherston, and Hoontrakul (2002) matches Government of Thailand issued Yankee bonds to U.S. government bonds of varying maturities to examine the factors that impact the pricing of Yankee bonds. Batten, Fetherston, and Hoontrakul (2006) expand on their initial study by examining the factors that impact the credit spreads of Yankee bonds issued by the governments of China, Korea, Malaysia, Philippines, and Thailand. Resnick (2012) compares the yield spreads and gross underwriting spreads of domestic, foreign, Eurobonds, and global bonds. Miller and Puthenpurackal (2002) and Cai and Zhu (2016) attempt to measure the stock market reaction of a non-U.S. company issuing a Yankee bond.[1]

[1] Miller and Puthenpurackal (2002) and Miller and Reisel (2011) also touch on the determinants of Yankee bond pricing.

There is a vast literature examining the potential underpricing of new equity issuances and their cause. Ritter (1984) and Ibbotson (1975) provide early evidence of this underpricing. Ritter and Welch (2002) provide an extensive summary of the literature examining the potential causes for the underpricing within the equity markets. Early examinations of the underpricing of corporate debt issues focused on the difference and convergence of the yield to maturity of a new bond offering compared to an outstanding corporate bond (see, for example, Ederington (1974), Weinstein (1978), or Sorensen (1982)). Cai, Helwege, and Warga (2007) give recent evidence showing that the underpricing exists in the corporate bond market, arguing that it is primarily due to information asymmetries.

Although there is a large literature on the impacts of institutional investors on security issuance, much of it focuses on the issuance of equity. For example, Chemmanur, Hu, and Huang (2010) examines the behavior of institutional investors around initial public offerings. The results indicate that institutional investors have significant private information regarding IPOs and receive compensation for their participation in IPOs. Chemmanur, He, and Hu (2009) show similar results for seasoned equity offerings, showing that institutional investors have private information and trade in the same direction as this information, causing information production.

This type of price pressure is unlikely to exist when examining subsequent transactions. There is, however, evidence that another type of price pressure could exist in these situations. Specifically, Ellul, Jokisthira, and Lundblad (2011) find that insurance companies, which are subject to regulation, may be forced to sell a bond from their portfolio if said bond is downgraded. A lack of counterparties means that the

insurance companies will be forced to sell the bonds at fire sale prices. This means that we can expect to find that a significant amount of sales by our institutions will be related to lower prices. Thus in both the primary and secondary market analysis we expect to find that net institutional purchasing activity will have a negative relationship with yields.

We also plan to examine the relationship between sovereign level risk and corporate bonds. Longstaff and Schwartz (1995) create a model that shows that a firm's asset value is correlated to interest rate risk above its impact on the risk of default of the firm. Duffee (1998) follows this empirically, finding that a firm's yield spread is correlated with Treasury rates even after controlling for firm specific variables such as the firm's credit risk. Elton et al. (2001) find that the yield spread is determined by the expected default of corporate bonds, the compensation for state taxes, and compensation for additional systematic risk in corporate bond returns relative to government bond returns. Huang and Huang (2012) show that credit risk accounts for only a small fraction of investment grade corporate yield spreads. Similar evidence of nondefault components in corporate spreads can be found in Jones, Mason, and Rosenfeld (1984), Duffie and Singleton (1997), Duffee (1999), Collin-Dufresne, Goldstein, and Martin (2001), and Eom, Helwege, and Huang (2003).[2] Similar recent literature (e.g. Durbin and Ng (2005), Borensztein, Cowan, and Valenzuela (2013), or Almeida, Cunha, Ferreira, and Restrepo (forthcoming)) has been examining the impact of sovereign credit ratings on corporate ratings. Evidence shows that rating agencies do regularly, though not universally, impose a credit ceiling on firms, refusing to grant a higher rating to a corporate entity than the country within which it is domiciled.

[2] Other papers, such as Longstaff, Mithal, and Neis (2005), find evidence that the majority of the corporate yield spread is explained by default risk.

Another strand of literature focuses on the potential spillover effects of sovereign credit crises to the local banking sector.[3] Further, there is theoretical evidence of a link between the health of the banking sector within a country and the firm-borrowers from these banks (e.g. Bernanke and Blinder (1988), Holmstrom and Tirole (1997), or Stein (1998)) and that banking crises can be caused from liquidity shortages (Diamond and Rajan (2005) or Schnabl (2012)). Chava and Purnanandam (2011) provide empirical evidence of this relationship, showing that firms that depend on banks suffering a liquidity crisis are adversely impacted by the banking crisis. Thus we believe that investors will include information regarding the liquidity environment of the domicile within which a Yankee issuer resides when forming their requirements on the Yankee debt's yield. This information will be particularly relevant in countries currently suffering from high credit risk and low liquidity, as they are the most likely to suffer a banking crisis that will adversely affect the issuing firm. We will proxy for the liquidity environment within a country using the bid-ask spread of the sovereign entity. We expect this to be a positive relationship with the Yankee bond's yield spread, as a larger bid-ask spread implies more potential liquidity issues.

[3] For example, see Acharya et al. (2014), Bolton and Jeanne (2011), or Gennaioli, Martin, and Rossi (2010)

CHAPTER THREE: DATA SOURCES AND SAMPLE CONSTRUCTION

The sample of Yankee bonds used here was gathered from the Mergent's Fixed Income Securities Database (FISD) database. FISD provides a high level of detail on individual bond issues and is frequently used to examine Yankee bonds (e.g. Miller and Reisel, 2011, and Huang et al., 2013). The sample starts with all 38,320 Yankee bonds issued between July 1st, 2002 and December 31st, 2014. Excluding medium-term notes reduces the sample to 3,825 bonds. Bonds with special features such as payment-in-kind or convertible are also excluded, further reducing the sample to 3,661 bonds. Next, government bonds and supranationals are excluded because they have different risk profiles than corporate entities, reducing the sample to 3,193 bonds. Next, non-fixed rate bonds are eliminated, which reduces the sample to 2,792 bonds. Next, eliminating bonds with no offering yield or not enough information to determine the offering yield reduces the sample to 2,361 bonds. Next, eliminating bonds with no sovereign credit or liquidity data reduces the sample to 918 bonds. Next, eliminating foreign agency bonds reduces the sample to 788 bonds. Finally, eliminating bonds for which there is not a previous Yankee issue in the Mergent FISD database from the same issuer reduces the sample to 405 bonds. Subsequent transactions of these remaining bonds after the offering date in both the TRACE and NAIC databases are collected through Mergent's FISD. Observations are matched by CUSIP, transaction date, transaction volume, and transaction price to control for duplicate observations across databases.

Two complications arise when matching the TRACE and NAIC databases. First, TRACE is a self-reported database, so duplicate observations might be missed because of human input error. Second, TRACE caps the reported volume of each trade at 1,000,000

for high-yield bonds and 5,000,000 for investment grade bonds. This can bias the treasury spread data by underweighting observations reported in TRACE with a transaction volume above the reporting cap. However, such bias as exists is not expected to significantly affect the results as the yields on a particular day tend to be similar to each other and only around five percent of our transactions are affected by the TRACE volume reporting cap.

Sovereign liquidity-risk is proxied by calculating the daily time series of the bid-ask spread on sovereign debt. On-the-run securities and starting dates used by Datastream are used to create their 10-year yields series. For countries that do not have a 10-year yields series on Datastream, Bloomberg's historical sovereign yield curve was used to find the appropriate bonds and dates. Countries with either inconsistent bid-ask data on Bloomberg or countries for which bid-ask spreads reported in terms of yields instead of prices are excluded. A sovereign credit-risk measure is created using Standard & Poor's long-term sovereign debt ratings and credit watch and credit outlook.

To measure the impact of net institutional purchasing activity on the prices of bonds, an appropriate proxy for the amount of net institutional purchasing activity within the U.S. bond market at any given time is needed. A proxy for this is data on insurance companies taken from the National Association of Insurance Commissioners (NAIC) on Mergent's FISD. Schultz (2001) and Campbell and Taksler (2003) estimate that insurance companies hold roughly one third of corporate bonds. Further, Edwards, Harris, and Piwowar (2007) note that insurance companies are relatively sophisticated investors within the market. Although TRACE data has a larger overall dataset, it did not begin recording buy/sell indicators within their trades until November, 2008. They also

do not report the identities of traders, making it impossible to determine which trades are occurring from sophisticated, institutional investors and which are not. Because of these limitations, insurance companies from the NAIC database are used as our institutional investors.

Credit ratings for the individual corporate issues are gathered through Mergent's FISD. Moody's ratings at bond issuance are used and supplemented with Standard & Poor's if data is missing from Moody's. Missing data are supplemented with ratings pulled from Thompson Reuter's SDC Platinum. Following Miller and Puthenpurackal (2002), the log of the foreign exchange rate is included, as changes in the foreign exchange rate may impact an investor's belief that a foreign corporation can pay its interest payments on time. Data on foreign exchange rates are gathered from the Federal Reserve Bank through Wharton Research Data Services. To control for the credit spread and term spread, the difference between Bank of America AAA and BBB corporate indices collected on Datastream issued for the credit spread. The difference between two- and ten-year Treasury rates, collected from the Federal Reserve Bank, is the term spread.

Descriptive statistics for the initial dataset are reported in Table 1. Panel A shows that the majority of the bonds occurred after the financial crisis, though a small number occurred both before and during the crisis. This is a result of the increased frequency of Yankee bond issuance over time and limitations to the sovereign liquidity data. Panel B indicates that the majority of the bonds are European and come from developed countries. Developing countries comprise only 9 bonds in the sample, or 2.22%. Meanwhile, European countries comprise 367 bonds in the sample, or 90.63%. Panel C shows that

most of the bonds have either high or medium-term maturities, as both timeframes constitute slightly over 40% of the sample. Panel D shows that most of the issuers received an investment grade in their debt. Of the issuers, 301 were able to receive a rating of BBB or better, 74.32% of the sample. Only 48 bonds, or 11.85% of the sample, did not have a rating available. Panel E shows that nearly half the bonds as being Rule 144A private placements and roughly two-thirds of the bonds are callable. No bonds in the dataset are attached to a sinking fund. The vast majority of the bonds are also senior status.

Table 1: Descriptive Statistics for Bond Issues

The sample consists of Yankee bonds issued from 6/1/2002 to 12/31/2014. Yankee bond information is taken from Mergent FISD. Rating data is supplemented by data from SDC. Sovereign CCR is calculated as in Gande and Parsley (2005) using Standard and Poor's sovereign long-term credit ratings.

	Number	Percentage
Panel A: Offering Year		
2003	1	0.25
2004	3	0.74
2005	4	0.99
2006	4	0.99
2007	7	1.73
2008	14	3.46
2009	54	13.33
2010	51	12.59
2011	55	13.58
2012	76	18.77
2013	67	16.54
2014	69	17.04
Total	**405**	**100.00**

	Number	Percentage
Panel B: Country		
Austria	4	0.99
China	5	1.23
France	50	12.35
Germany	3	0.74
Greece	1	0.25
Indonesia	4	0.99
Ireland	10	2.47
Italy	13	3.21
Korea	29	7.16
Netherlands	69	17.04
Norway	24	5.93
Russia	12	2.96
Spain	15	3.70
United Kingdom	166	40.99
Total	**405**	**100.00**

(Table 1 Continued)

	Number	Percentage
Panel C: Maturity Length		
High (>10 years)	167	41.23
Medium	177	43.70
Low (<5 Years)	61	15.06
Total	**405**	**100.00**
Panel D: Rating		
AAA	7	1.73
AA	104	25.68
A	109	26.91
BBB	81	20.00
BB	29	7.16
B	22	5.43
CCC	5	1.23
NR	48	11.85
Total	**405**	**100.00**
Panel E: Descriptive Statistics		
Rule 144a Bonds	169	41.73
Callable	247	60.99
Sinking Fund	0	0.00
Senior	395	97.53

CHAPTER FOUR: CONSTRUCTION OF MAIN VARIABLES

The main variable of interest is the Yankee bonds' yield spread over a maturity matched United States Treasury bond, which is included in the FISD database. However, there are cases where the Treasury spread is missing in the offering yield data despite the observation containing data on the date of issuance, yield, and maturity of the bond. The Treasury spread over the nearest annual Treasury bond is calculated in these situations, linearly interpolating between Treasury maturities. Data on the historical yield curve is gathered from the Federal Reserve Bank. These steps are repeated for the subsequent transactions of bonds, using linear interpolation between Treasury maturities at the monthly level.

In the time series there are multiple observations on a given day. To account for this, all of the transactions from a single day are aggregated into one observation after merging the TRACE and NAIC datasets by taking the weighted average of the treasury spread for bond *i* on date *j* using the volume of the individual transactions as weight.[4] The data are further compressed by taking the simple average of the control variables across the months of the time series regressions and compare these values to the final daily observation for a given month.

To create a measure of sovereign credit-risk, Gande and Parsley (2005) are followed by calculating a comprehensive credit rating (CCR) using sovereign credit ratings.[5] Ratings from B- to AAA are initially coded from 1 to 16, with ratings below B-

[4] Prior to merging the datasets we must take additional steps to clean the TRACE database which are outlined in Appendix I.

[5] We recognize that it is preferable to proxy for a country's isolated credit-risk using credit default swap rates (e.g. Beber, Brandt, and Kavajecz (2008)), but data limitations led us to feel that a comprehensive credit rating would give us our most complete results.

coded as 0. One is subtracted from the rating if the credit outlook for a country is rated as negative, and 0.5 is subtracted if the credit outlook is "credit watch – negative." Similar positive adjustments are made for credit outlook rated as positive and "credit watch – developing." The final rating is bound between 0 and 16, so a rating of CCC with a credit outlook of negative is coded as 0. To proxy for sovereign liquidity-risk, the bid-ask spread of the sovereign debt is used. Bid-ask spreads are commonly used when looking at the liquidity of an individual bond. However, here it proxies for the overall liquidity environment within a country.[6] The sovereign bid-ask spread is calculated as the difference between the daily bid and ask prices for the sovereign debt on Bloomberg, where available.

To devise a way to measure institutional investor net purchasing activity of an issuer prior to a bond issue, bond net purchasing activity of previous bond issues from a given issuer in the months prior to the origination date of a new issue from the same issuer are examined. The institutional buying and selling activity of these prior issues are gathered by aggregating the total dollar value of all purchases and sales by insurance companies on a given day. The net institutional buying activity is calculated as the difference of the buying and selling activity by the insurance companies on a given day. This value is aggregated for a various number of days prior to the origination date of the issue of interest, ranging from a window of t = [-90, -1] to t = [-30, -1]. The data are scaled to billions of dollars due to the size of the transaction activity within these windows. This variable is expected to have a negative relationship with the offering

[6] Another possible option would be to use the spread between a government guaranteed agency bond and sovereign debt, e.g. Monfort and Renne (2013), but we do not have a large enough sample of government guaranteed agency bonds for our countries and time period.

yield due to a relatively large amount of institutional purchasing generating a positive signal to the market about the issuing firm.

There is a correlation between the frequency with which bonds are traded and their yields. Specifically, bonds that are traded relatively infrequently tend to have higher yields. To account for this, the total institutional transaction activity is calculated as the sum of the total dollar value of all purchases and sales by insurance companies on a given day. Similarly, these values are aggregated for the same windows as the net institutional purchasing activity. This additionally helps focus the analysis on the relative difference of institutional purchases and sales instead of the gross difference. This variable is expected to have a negative relationship with the offering yield, though its significance is of less importance than the net institutional purchasing activity.

CHAPTER FIVE: EMPIRICAL ANALYSIS

SECTION 5.1: YIELD SPREADS AT ISSUANCE

Univariate results are reported in Table 2. Panel A shows that the sample is significantly weighted towards bonds issued after the financial crisis.[7] An expected increase in spreads during and immediately following the crisis with an expected decline in spreads after 2009 is observed. Panel B shows the home domiciles of the issuers of the Yankee bonds. Some countries are home to very safe issuers (e.g. Spain has a mean treasury spread of 168.8000) while others are home to very unsafe issuers (e.g. issuers in Ireland have a mean treasury spread of 529.3000, or issuers in Russia with a mean treasury spread of 406.7000). Panel C separates the sample by sovereign CCR, a measure of sovereign credit-risk. As expected, there is a consistent trend of higher quality borrowers originating from countries with lower sovereign credit-risk.[8] Panel D looks at how treasury spreads vary across the quintiles of countries sorted by the bid-ask spread of their sovereign debt, a measure of sovereign liquidity. The first quintile, where sovereign bid-ask spreads are the smallest, is the most liquid and is related to the lowest corporate bond spreads. Although the middle three quintiles do not show much variation, there is a large jump in the fifth quintile, signifying early evidence that investors demand a larger premium when purchasing bonds from illiquid countries. Panel E analyzes the institutional net buying activities of previously issued bonds in the 90 days prior to the origination date of the bond of interest. There is an increase in the yield from the first to

[7] This is partially due to our data limitations in sovereign level data before the financial crisis.

[8] We have the odd result that bonds issued by companies domiciled in countries with a CCR of four or less have a slightly lower average treasury spread than bonds issued by companies domiciled in countries with a CCR of five through ten. We believe this to be an aberration due to the small sample size within these buckets.

third quintiles of institutional net buying activities followed by the expected negative relationship as we move from the third to fifth quintiles. The unexpected positive relationship is driven by the total buying activities within these quintiles, as both the first and fifth quintiles have significant total institutional activity while the third quintile contains bonds that are traded on a relatively sparse basis. This shows the need to control for our total institutional buying activities, which we investigate in Panel F. Here we see the previously explained result that bonds that are traded less frequently by institutions tend to have higher yields.

Table 2: Descriptive Statistics for Yield Spreads on Yankee Bonds

The sample consists of Yankee bonds issued from 6/1/2002 to 12/31/2014. Institutional transaction activity and Yankee bond information are taken from Mergent FISD. Gross spread and rating data is supplemented by data from SDC. Sovereign bid-ask spread is calculated as the difference between ask and bid prices for sovereign debt on Bloomberg. Sovereign CCR is calculated as in Gande and Parsley (2005) using Standard and Poor's sovereign long-term credit ratings.

Panel A: By Year				
	Number	**Mean**	**Median**	**Std. Dev.**
2003	1	380.0000	380.0000	-
2004	3	301.6667	128.0000	325.3496
2005	4	144.5000	103.5000	120.0236
2006	4	160.8750	161.0000	81.2469
2007	7	170.7143	116.0000	86.6578
2008	14	386.8714	397.6000	97.7168
2009	54	299.0490	208.5500	264.3173
2010	51	209.7392	158.0000	153.5079
2011	55	211.4274	183.0000	112.0860
2012	76	226.8604	177.5000	187.4379
2013	67	177.6478	123.7970	136.2559
2014	69	187.5862	123.0000	162.1981
Panel B: By Country				
Austria	4	550.0000	577.0000	197.8198
China	5	345.8973	275.0000	220.3321
Germany	3	104.0513	22.3040	144.5921
Spain	15	168.8000	130.0000	95.8177
France	50	190.6858	122.5000	169.9986
United Kingdom	166	212.5647	161.2500	183.8499
Greece	1	609.0000	609.0000	.
Indonesia	4	347.4250	359.0500	117.2613
Ireland	10	529.3000	462.5000	178.6224

Italy	13	193.3702	187.5000	85.2954
Korea	29	189.8514	175.0000	95.4288
Netherlands	69	220.0919	190.0000	161.0196
Norway	24	112.7985	95.0000	81.2013
Russia	12	406.7000	405.3500	82.6525
Panel C: By Sovereign CCR				
	Number	**Mean**	**Median**	**Std. Dev.**
4	4	388.4000	361.3000	176.4614
5	1	445.1000	445.1000	.
7	2	415.2060	415.2060	224.0029
8	8	425.8250	374.9000	197.9163
9	3	427.1667	441.5000	46.6807
10	7	452.0286	458.0000	23.2280
11	23	237.6434	198.0000	99.9566
12	18	158.7996	130.7530	84.3304
13	13	322.4221	235.0000	230.0569
14	25	178.8779	93.0000	228.4891
15	118	202.6599	159.1010	151.4059
15.5	4	233.7500	235.0000	18.8746
16	179	207.6026	156.9950	182.7659
Panel D: By Sovereign Bid-Ask Spread Quintile				
First	119	176.8688	129.2980	148.7923
Second	117	242.8889	187.5000	205.1145
Third	42	218.9559	161.2500	169.9400
Fourth	83	230.5445	207.1000	138.9054
Fifth	44	270.0466	179.0000	216.9445
Panel E: By Institutional Net Buying Activities Quintile				
First	84	174.5848	124.4490	117.8652
Second	79	244.2419	195.0000	162.2215
Third	80	324.7766	275.0000	238.8562
Fourth	82	203.2974	140.0000	162.5743
Fifth	80	163.3253	130.0000	135.6417
Panel F: By Institutional Total Buying Activities Quintile				
First	81	355.8013	323.0000	219.9321
Second	82	247.0969	192.5000	189.0237
Third	80	195.2682	149.0000	139.1228
Fourth	81	145.0356	105.0000	93.8792
Fifth	81	163.3036	130.0000	130.7943

In a multivariate analysis a model where the at-issuance spread is the dependent variable is employed. To control for the default risk of the bond, the size of the issue, the maturity of the issue, the presence of relevant provisions, and the exchange rate between the two countries, firm and year fixed effects are added to the models. The following model is estimated using ordinary least squares with standard errors clustered at the country-domicile level:

$$YLDSPD_i = \beta_0 + \beta_1 MainVariables_i + \beta_2 CRED_i + \beta_3 TERM_i + \beta_4 AMT_i + \beta_5 MAT_i + \beta_6 FX_i + \beta_7 CALL_i + \beta_8 SE_i + \beta_9 RULE144A_i + \beta_{10} INVEST_i + u_i \quad (1)$$

Define *YLDSPD* to be the at-issuance spread between the yield of the bond and the closest maturity-matched U.S. Treasury. The variables of interest include the log of institutional buying pressure, the log of institutional selling pressure, the bid-ask spread of sovereign debt of the firm issuer's domicile, and the comprehensive credit rating of the firm issuer's domicile. Institutional buying and selling pressure are calculated as the total dollar value of purchases and sales of insurance companies on a given date in the NAIC database. *CRED* is the difference between the Bank of America AAA and BBB corporate indices. *TERM* is the difference between the ten- and two-year U.S. Treasuries. *AMT* is the natural log of the offering amount of the issue. *MAT* is the natural log of the time to maturity of the issue in years. *FX* is the natural log of the 30-day historical volatility of the exchange rate between the currency of the firm-issuer's domicile and the United States dollar. *CALL* is an indicator variable that is equal to 1 if the issue has a call provision attached to it and 0 otherwise. *SEN* is an indicator variable that is equal to 1 if the bond has senior status and 0 otherwise. *RULE144A* is an indicator variable that is equal to 1 if the bond is issued using Rule 144A of the SEC and 0 otherwise. *INVEST* is an indicator variable that is equal to 1 if the bond has investment grade status for its credit rating and 0 otherwise.

The control variables are common to the literature so only a limited discussion is provided here. The credit spread and term spread are included to help account for overall macroeconomic conditions at the time of issuance. The term spread proxiesfor the slope

of the term structure and the credit spread will proxy for the current credit-risk premium in the United States debt markets. The size of an issue may be important by being associated with more public information on the issue and the issuer. Large issues may also give the issuer more liquidity and provide an issue a lower yield. Higher volatility in the exchange rate between the firm-issuer's domicile and the United States will cause bondholders to fear that the company is less likely to be able to pay interest payments in U.S. dollars, so the sign on the foreign exchange volatility is expected to be positive. Bonds with senior status are expected to command lower yields due to their relatively lower risk. Previous studies have shown[9] that Rule 144A private placements have higher yields than Yankee bonds. Investment grade bonds are expected to have lower yields than high-yield bonds.

Table 3 contains the initial multivariate results for treasury spreads using a thirty-day and ninety-day window prior to the origination date of the bond of interest. In the first model, net institutional buying activity is significant at the 10% level, while the total institutional transaction activity is insignificant. The coefficient of -181.06 indicates that an increase in net buying activity within the thirty days prior to the origination date of $1 billion is associated with a decrease in the offering yield of 181.06 basis points. In the second model, net institutional buying activity is significant at the 5% level, while the total institutional transaction activity remains insignificant. Sovereign credit-risk is significant at the 5% level in all three models, while sovereign liquidity-risk is insignificant in all the models. Initial results indicate that net institutional buying pressure

[9] e.g. Huang et al. (2013), Resnick (2012), and Chaplinsky and Ramchand (2004)

and sovereign credit-risk play a part in determining the origination yield spreads while sovereign liquidity-risk does not.

Table 3: Determinants of Offering Yield Spreads of Yankee Bonds

The sample consists of Yankee bonds issued from 6/1/2002 to 12/31/2014. Institutional transaction pressure and Yankee bond information are taken from Mergent FISD. Institutional net buying (total transaction) activity is the difference (sum) of the dollar value of all purchases of prior Yankee issues from the bond issuer occurring in the appropriate window prior to the bond origination date and the dollar value of the sales of those bonds. Sovereign bid-ask spread is calculated as the difference between ask and bid prices for sovereign debt on Bloomberg. Term spread is the difference between 2-year and 10-year Treasury rates from the Federal Reserve. Exchange rates are taken from the Federal Reserve. Sovereign CCR is calculated as in Gande and Parsley (2005) using Standard and Poor's sovereign long-term credit ratings. Investment Grade is an identifier variable that takes the value of 1 if the debt issuance is investment grade, 0 otherwise. Standard errors are clustered at the issuer level. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Institutional Activity in t = -30 to t = -1 Window	Institutional Activity in t = -90 to t = -1 Window
Net buying activity	**-181.06**	**-122.67**
	(90.09)*	**(51.24)****
Total transaction activity	-234.42	-78.21
	(171.39)	(59.92)
Sovereign Bid-ask spread	-25.53	16.73
	(47.83)	(47.08)
Sovereign CCR	**-27.69**	**-27.93**
	(11.86)**	**(8.70)*****
Credit spread	**-119.70**	**-79.14**
	(15.50)***	**(8.70)*****
Term spread	**38.18**	23.18
	(15.64)**	(16.77)
Log(Offering amount)	**-66.58**	**-60.86**
	(11.59)***	**(7.39)*****
Log (Maturity)	**39.01**	**40.23**
	(12.24)***	**(11.14)*****
Log(Exchange Rate)	**0.17**	**0.19**
	(0.05)***	**(0.04)*****
Callable	-18.09	-21.49
	(26.64)	(22.65)
Senior	**-86.00**	**-77.69**
	(21.02)***	**(32.52)****
Rule 144a	5.32	**14.83**
	(11.56)	**(7.45)***

Investment Grade	**-153.04 (11.80)*** **	**-162.96 (18.40)*** **
N	342	405
R^2	.569	.602

SECTION 5.2: EXTENDED ANALYSIS FOR ISSUANCE YIELD SPREADS

The base case is expanded by including two additional influences on Yankee yield spreads: bondholder rights in the issuing firm's home domicile and non-Yankee issuances by the issuers in the sample. A proxy for bondholder rights is the strength of legal rights index developed by the World Bank. Although 2013 is the earliest year the index is available, the 2013 values of the index are used for every year in the sample.[10] We use the 2013 values of the index for every year in our sample. Previous studies (e.g. Miller and Reisel and Qi, Roth, and Wald) show there is a trade-off between investor protection within the country domicile of the bond issuer and the number of protective covenants attached to an individual bond.

The SDC Platinum global issues database is used to find all debt issuances by issuers in the sample matched by 6-digit CUSIP. These issuances are then checked for matches to bonds in the sample by matching on offering date, offering amount, and coupon rate with the matches removed. Bonds that are listed as being issued in the marketplace of either "U.S. Private" or "U.S. Public" are also removed. A flag is created for any bond whose issuer has an international debt issuance within six months of the Yankee bond in the sample, a variable for the total number of international issuances within six months of the origination date of an observed bond, and a variable calculating

[10] This will likely not be a problem due to the limited changes of creditor rights values over time. Djankov et al. (2007) creates a similar index and notes that the index values are very consistent throughout time, with a correlation of 0.95 between their 2003 and 1978 creditor rights index's values.

the percent of the offering amount of the international issuances relative to the combined offering amount of the international issuances and the bond in the sample. Sixty-six of the 405 bonds in the sample have at least one such international issuance.

The results of the first series of extensions are contained in Table 4, using the ninety-day window of institutional transaction activity as it contains most of the relevant information regarding institutional transactions. In the first specification, the country fixed effects are replaced with the strength of legal rights index from the World Bank. The creditor rights index is significant at the 10% level with a positive sign, indicating that investors pay a premium for bonds being issued from countries with lower creditor rights. This may be caused by the relatively small number of countries represented in the sample, causing a bias in the result. An indicator variable that is equal to one when a bond has an international issuance within six months of the origination date of the observation bond and zero otherwise is also included, but it is insignificant.

The next specification adds the count of international issuances within six months of the origination date of the observed bond. It, along with the flag representing such that the firm has such an issuance, remain insignificant. The final specification replaces the count of the international bonds with the relative size of the international bonds. Here, both the flag and the relative amount become significant at conventional levels. The size of the coefficients indicate that a bond with a total international issuance the same size as the observed bond's origination amount will see almost no change in its yield (an increase of 110.79 basis points for having an international issuance, but a decrease of 72.61 basis points for a relatively small international issuance amount of 50%). The mean relative percentage amount for firms with an international issue is 71.13%,

indicating that the average firm in the subsample is able to obtain a yield 20 basis points under an equivalent firm without an international issuance. This may be proxying for a size effect within the data, as a larger international firm may be more visible and be viewed more favorably, along with being able to issue relatively more non-Yankee debt.

Table 4: Robustness Check: Additional Control Variables

The sample consists of Yankee bonds issued from 6/1/2002 to 12/31/2014. Institutional transaction pressure and Yankee bond information are taken from Mergent FISD. Institutional net buying (total transaction) activity is the difference (sum) of the dollar value of all purchases of prior Yankee issues from the bond issuer occurring in the 90 days prior to the bond origination date and the dollar value of the sales of those bonds. Sovereign bid-ask spread is calculated as the difference between ask and bid prices for sovereign debt on Bloomberg. Term spread is the difference between 2-year and 10-year Treasury rates from the Federal Reserve. Exchange rates are taken from the Federal Reserve. Sovereign CCR is calculated as in Gande and Parsley (2005) using Standard and Poor's sovereign long-term credit ratings. Investment Grade is an identifier variable that takes the value of 1 if the debt issuance is investment grade, 0 otherwise. The creditor rights index is taken from the 2013 values of the World Bank Strength of Legal Rights Index. Standard errors are clustered at the country level. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Variable	Institutional Activity in t = -90 to t = -1 Window		
Net buying activity	**-135.58**	**-137.98**	**-122.52**
	(33.08)* **	**(35.80)*** **	**(32.69)*** **
Total transaction activity	-66.92	-68.59	-55.85
	(57.05)	(56.13)	(57.75)
Sovereign Bid-ask spread	19.73	18.30	15.78
	(48.64)	(48.07)	(47.45)
Sovereign CCR	**-19.64**	**-20.17**	**-21.13**
	(5.06)* **	**(5.19)*** **	**(4.74)*** **
Credit spread	**-79.05**	**-79.32**	**-80.11**
	(8.58)* **	**(8.68)*** **	**(8.20)*** **
Term spread	25.06	25.38	24.99
	(17.99)	(17.46)	(15.43)
Log(Offering amount)	**-56.49**	**-56.38**	**-56.93**
	(8.64)* **	**(8.57)*** **	**(8.27)*** **
Log (Maturity)	**37.31**	**37.07**	**32.85**
	(10.03)* **	**(9.87)*** **	**(10.86)*** **
Log(Exchange Rate)	**-0.13**	**-0.13**	**-0.13**
	(0.04)* **	**(0.04)*** **	**(0.04)*** **
Callable	-7.49	-9.04	-6.30
	(30.99)	(32.56)	(28.29)
Senior	**-91.26**	**-88.55**	**-95.31**
	(38.30) **	**(41.49)* **	**(34.65)** **
Rule 144a	**28.35**	**25.94**	**31.15**
	(11.17) **	**(12.36)* **	**(9.62)*** **
Investment Grade	**-179.65**	**-179.40**	**-175.19**
	(13.56)* **	**(13.14)*** **	**(13.44)*** **

World Bank Creditor Rights Index	**10.27**	**10.16**	**9.42**
	(5.04)*	**(4.96)***	**(4.88)***
Non-Yankee Issuance Flag	-20.04	-10.72	**110.79**
	(21.79)	(26.15)	**(47.64)****
Non-Yankee Issuance Count		-0.44	
		(0.74)	
Non-Yankee Issuance Relative Amount			**-183.40**
			(45.17)***
N	405	405	405
R^2	.562	.563	.571

The next specification turns to investigating the potential impact of sovereign liquidity risk on bonds. As stated previously, the sovereign bid-ask spread is expected to be most relevant in environments where there is a significant amount of prevailing credit risk. Investors may worry that countries with significant credit-risk may experience a spillover into the banking sector, and that a banking sector with significant liquidity issues may subsequently experience a spillover into the corporate borrowers of the banking sector. Thus, the sovereign bid-ask spread is expected to be the most relevant in countries that are both high in sovereign credit risk and currently experiencing low liquidity. To measure this, the data is first segmented into two equal size groups segmented by sovereign CCR. The group containing the bottom half of the sovereign CCR observations is then split into two more groups, this time segmenting by sovereign bid-ask spread. The firms with high bid-ask spreads coming from the low sovereign CCR group represent firms in countries with high credit-risk and low liquidity.[11] A dummy variable is created that equals 1 for these firms and 0 for the others. This dummy variable is interacted with the sovereign bid-ask spread. The results are reported in Table 5.

[11] We get similar results if we first segment on sovereign bid-ask spread and subsequently segment on sovereign CCR.

The net buying activity and sovereign CCR remain significant with the expected sign at the 1% level. Now, the sovereign bid-ask spread is negative and significant at the 5% level, while its interaction term with the dummy variable is positive and significant at the 10% level. The bid-ask spread is measured in dollars, indicating that a one-dollar increase in the bid-ask spread of a firm in a high credit-risk, low liquidity country will increase the yield of a new debt issuance roughly 140 basis points relative to an issuer from a lower credit-risk or more liquid country. This supports the idea that investors are wary of bonds being issued by firms that are domiciled in countries with significant credit risk and low amounts of liquidity due to the potential of a banking crisis and its impact on the firm's ability to repay their debt obligations.

Table 5: Determinants of Offering Yield Spreads for Yankee Bonds from Countries with High Credit Risk and Low Liquidity

The sample consists of Yankee bonds issued from 6/1/2002 to 12/31/2014. Institutional transaction pressure and Yankee bond information are taken from Mergent FISD. Institutional net buying (total transaction) activity is the difference (sum) of the dollar value of all purchases of prior Yankee issues from the bond issuer occurring in the 90 days prior to the bond origination date and the dollar value of the sales of those bonds. Sovereign bid-ask spread is calculated as the difference between ask and bid prices for sovereign debt on Bloomberg. Sovereign CCR is calculated as in Gande and Parsley (2005) using Standard and Poor's sovereign long-term credit ratings. We suppress the reporting of some of the control variables, but use the same controls as those from Table 3. Standard errors are clustered at the issuer level. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Net buying activity	**-120.36**
	(36.43)* **
Total transaction activity	-54.34
	(59.52)
Sovereign bid-ask spread	**-76.25**
	(34.56) **
Sovereign CCR	**-15.53**
	(5.03)* **
World Bank Creditor Rights Index	7.43
	(4.84)
Non-Yankee Issuance Flag	**101.79**
	(41.95) **

Non-Yankee Issuance Relative Amount	**-168.63** **(37.43)**
Low liquidity, high credit risk flag	14.19 (45.50)
(Low liquidity, high credit risk flag) x sovereign bid-ask spread	**139.90** **(70.61)***
N	405
R^2	.577

The relationship of sovereign credit risk on corporate debt is also explored. Almeida et al. (forthcoming) show that a sovereign debt's credit receiving a rating downgrade has an asymmetric impact on bound firms (i.e. those that have a credit rating at least as high as the country within which they are domiciled) and unbound firms. Specifically, bound firms will have a significantly larger increase in bond yields than a similar unbound firms. This potential link between sovereign credit ratings and corporate bond yields suggests testing whether investors require different yields on the debt issued by these bound and unbound firms. To do this, a dummy variable that is equal to 1 if the firm is a bound firm and 0 if the firm is unbound is created and interacted with the sovereign CCR. The model is estimated both with and without the dummy variable for investment grade corporate debt to attempt to remain robust to potential biases. The results of the regressions are reported in Table 6.

The result of the first regression shows that net buying activity remains significant at the 1% level, along with the sovereign CCR at the 5% level. The second specification, which drops the dummy variable representing an investment grade on the corporate debt, has both variables come in at the 1% level. Interestingly, neither the flag representing a firm that is a boundary firm nor its interaction with the sovereign CCR comes in significant in either specification. This implies that although sovereign credit ratings can

asymmetric impact on boundary firms and nonboundary firms following a sovereign credit rating downgrade, investors do not treat the boundary and nonboundary firms differently upon the origination date of the corporate bonds.

Table 6: Determinants of Yield Spreads of Yankee Bonds for Boundary and Non-Boundary Firms

The sample consists of Yankee bonds issued from 6/1/2002 to 12/31/2014. The left model contains a dummy variable for Investment Grade, while the right model omits this dummy. Institutional transaction pressure and Yankee bond information are taken from Mergent FISD. Institutional net buying (total transaction) activity is the difference (sum) of the dollar value of all purchases of prior Yankee issues from the bond issuer occurring in the 90 days prior to the bond origination date and the dollar value of the sales of those bonds. Sovereign bid-ask spread is calculated as the difference between ask and bid prices for sovereign debt on Bloomberg. Sovereign CCR is calculated as in Gande and Parsley (2005) using Standard and Poor's sovereign long-term credit ratings. Investment Grade is an identifier variable that takes the value of 1 if the debt issuance is investment grade, 0 otherwise. The creditor rights index is taken from the 2003 values of the index created in Djankov et al. (2007). We suppress the reporting of some of the control variables, but use the same controls as those from Table 3. Standard errors are clustered at the issuer level. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Net buying activity	**-126.62**	**-102.45**
	(29.67)* **	**(30.00)*** **
Total transaction activity	-65.39	**-98.39**
	(52.43)	**(40.25)** **
Sovereign bid-ask spread	3.86	-26.40
	(49.33)	(62.09)
Sovereign CCR	**-21.24**	**-27.58**
	(6.50) **	**(8.62)*** **
Investment Grade	**-167.21**	
	(12.93)* **	
World Bank Creditor Right's Index	7.08	7.10
	(5.10)	(6.00)
Non-Yankee Issuance Flag	**107.40**	131.17
	(49.40) **	(74.25)
Non-Yankee Issuance Relative Amount	**-176.70**	**-222.01**
	(48.53) **	**(72.02)*** **
Boundary firm flag	84.43	-9.58
	(117.09)	(117.00)
(Boundary firm flag) x sovereign CCR	-9.86	-6.62
	(8.16)	(7.91)
N	405	405
R^2	.578	.481

The final analysis examines the difference between public debt and private Rule 144A debt. An immediate reaction is that institutional transaction activity may not have an impact for our private Rule 144A debt, as only qualified institutional buyers as defined by the SEC are allowed to trade on Rule 144A debt. However, the insurance companies do meet this definition, indicating that institutional transaction activity can have an impact on the private issues. The results are reported in Table 7.

The determinants of public and private debt are, in fact, different. Institutional net purchasing activity and the sovereign CCR are significant at the 5% and 1% level for public debt, respectively, while neither are significant for private debt. The coefficients for the dummy variable signifying a non-Yankee issuance within six months of the origination date of the observed bond and the relative amount of non-Yankee issuance are both significant at the 1% level for private debt. The size of the coefficients again indicates that firms issuing private placements that simultaneously issue a significantly larger amount of non-Yankee debt are able to generate a lower yield on their Rule 144A private placement.

There are two potential explanations for this. First, the firms may be larger than those unable to issue additional non-Yankee debt around the same time, causing these firms to appear safer to investors. Second, investors may be more familiar with firms issuing significantly more non-Yankee debt. This would alleviate part of the difference in yields between public and private debt associated with investors being less familiar with Rule 144A debt issuers (Huang et al.).

Table 7: Determinants of Yield Spreads of Yankee Bonds, Public and Private Debt

The sample consists of Yankee bonds issued from 6/1/2002 to 12/31/2014. Institutional transaction pressure and Yankee bond information are taken from Mergent FISD. Institutional net buying (total transaction) activity is the difference (sum) of the dollar value of all purchases of prior Yankee issues from the bond issuer occurring in the 90 days prior to the bond origination date and the dollar value of the sales of those bonds. Sovereign bid-ask spread is calculated as the difference between ask and bid prices for sovereign debt on Bloomberg. Term spread is the difference between 2-year and 10-year Treasury rates from the Federal Reserve. Exchange rates are taken from the Federal Reserve. Sovereign CCR is calculated as in Gande and Parsley (2005) using Standard and Poor's sovereign long-term credit ratings. Investment Grade is an identifier variable that takes the value of 1 if the debt issuance is investment grade, 0 otherwise. The creditor rights index is taken from the 2003 values of the index created in Djankov et al. (2007). Standard errors are clustered at the issuer level. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Variable	Public Debt	Private Debt
Net buying activity	**-114.32**	-21.75
	(37.24)**	(164.02)
Total transaction activity	-60.31	-241.05
	(47.77)	(175.53)
Sovereign Bid-ask spread	-5.16	55.59
	(19.49)	(84.56)
Sovereign CCR	**-25.97**	-14.37
	(4.84)***	(8.64)
Credit spread	-37.55	**-138.98**
	(21.63)	**(22.54)*****
Term spread	15.07	**55.59**
	(265.64)	**(30.66)***
Log(Offering amount)	**-43.13**	**-111.99**
	(7.01)***	**(27.98)*****
Log (Maturity)	**24.98**	**68.09**
	(5.12)***	**(18.02)*****
Log(Exchange Rate)	**-0.23**	-0.07
	(0.10)**	(0.05)
Callable	-54.69	13.08
	(30.49)	(30.25)
Senior	-95.92	**-127.66**
	(75.97)	**(27.35)*****
Investment Grade	**-111.80**	**-177.73**
	(32.13)***	**(29.68)*****
World Bank Creditor Right's Index	**8.44**	7.65
	(2.40)***	(5.53)
Non-Yankee Issuance Flag	67.36	**136.72**
	(44.20)	**(40.02)*****
Non-Yankee Issuance Relative Amount	**-158.14**	**-215.75**
	(62.28)**	**(55.40)*****
N	236	169
R^2	.528	.626

SECTION 5.3: TIME SERIES RESULTS

To test the robustness of the results regarding the impact of sovereign credit- and liquidity-risk as well as institutional transaction activity, the secondary market transactions for the bonds is utilized. The aspects of the economy, the individual bond, and the debt market that impact the Yankee bond's price at issuance should have a similar effect on the price of Yankee bonds in secondary market transactions. Transaction data for the 405 Yankee bonds from both NAIC and TRACE are gathered. TRACE data requires an additional cleaning step detailed in Appendix I. The weighted average of the daily transactions using volume as the weight is calculated and the last daily observation within the month is used for the bond-month transaction spread. The average treasury spread for bond *i* at the end of month *t* is regressed against to the simple average of the explanatory variables in the window of months prior to *t*. This window is adjusted to be months $t = [-1, -1]$, $t = [-2, -2]$, $t = [-3, -3]$, and $t = [-3, -1]$. Standard errors are now clustered at the issue level, as there are now have multiple observations for each individual issue. We replace our flag for investment grade with flags for individual credit ratings which are omitted from the tabulated results.[12] The results are reported in Table 8.

The results indicate that all of the variables of interest are impactful when investigating the secondary market transactions of Yankee bonds.[13] The net institutional buying activity, total institutional transaction activity, and sovereign CCR are all

[12] We make this adjustment due to the increase in the number of observations within each bond rating due to our bond-month observations. Our results are qualitatively similar using the investment grade dummy as before.

[13] The results in our time series data are all winsorized at the 1% and 99% level within their respective sample.

Table 8: Determinants of Time Series of Yield Spreads of Yankee Bonds

The sample consists of Yankee bonds issued from 6/1/2002 to 12/31/2014. Institutional transaction pressure and Yankee bond information are taken from Mergent FISD. Institutional net and total transaction activity are calculated within a varying number of calendar months prior to the transaction observation month. Sovereign bid-ask spread is calculated as the difference between ask and bid prices for sovereign debt on Bloomberg. Term spread is the difference between 2-year and 10-year Treasury rates from the Federal Reserve. Exchange rates are taken from the Federal Reserve. Sovereign CCR is calculated as in Gande and Parsley (2005) using Standard and Poor's sovereign long-term credit ratings. Investment Grade is an identifier variable that takes the value of 1 if the debt issuance is investment grade, 0 otherwise. Standard errors are clustered at the individual bond level. Results are winsorized at the 1% and 99% levels. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Institutional Activity in t = -1 Calendar Month Window	Institutional Activity in t = -2 Calendar Month Window	Institutional Activity in t = -3 Calendar Month Window	Institutional Activity in t = -3 to t = -1 Calendar Month Window
Net buying activity	**-51.28**	**-40.57**	**-48.18**	**-51.76**
	(14.38)* **	**(11.17)*** **	**(11.85)*** **	**(10.99)*** **
Total transaction activity	**-24.04**	**-37.10**	**-32.66**	**-30.27**
	(12.74)*	**(12.17)*** **	**(12.42)*** **	**(9.91)*** **
Sovereign Bid-ask spread	**104.75**	**102.70**	**114.49**	**82.67**
	(41.58) **	**(41.06)** **	**(42.22)*** **	**(37.49)** **
Sovereign CCR	**-7.81**	**-8.54**	**-7.46**	**-7.44**
	(2.57)* **	**(2.62)*** **	**(2.63)*** **	**(2.62)*** **
Credit spread	**-86.91**	**-87.09**	**-84.86**	**-82.36**
	(6.36)* **	**(6.64)*** **	**(6.90)*** **	**(6.68)*** **
Term spread	**68.28**	**69.85**	**70.14**	**68.13**
	(4.78)* **	**(4.65)*** **	**(4.73)*** **	**(4.78)*** **
Log(Offering amount)	9.97	6.97	9.24	5.42
	(8.71)	(8.82)	(8.77)	(8.56)
Log (Maturity)	**121.35**	**120.99**	**121.46**	**119.69**
	(3.93)* **	**(4.00)*** **	**(3.93)*** **	**(3.92)*** **
Log(Exchange Rate)	**24.18**	**24.67**	**26.14**	**24.87**
	(4.13)* **	**(4.03)*** **	**(3.96)*** **	**(3.94)*** **
Callable	**-59.78**	**-60.08**	**-60.51**	**-58.27**
	(10.69)* **	**(10.78)*** **	**(10.69)*** **	**(10.36)*** **
Senior	-29.62	-32.43	-30.42	-27.91
	(20.65)	(20.30)	(20.60)	(21.17)
Rule 144a	3.03	1.63	1.08	1.89
	(9.17)	(8.99)	(9.21)	(9.25)
N	6,143	6,129	6,165	6,568
R^2	.759	.756	.760	.764

significant with the expected sign at the 1% level in the t = [-3, -1] window, while the sovereign bid-ask spread is significant at the 5% level. These results are similar to those for primary market transactions, albeit with stronger significance. Similar results are obtained with varying levels of statistical significance for the other chosen windows, indicating that the results are robust regardless of the window chosen.

Following the original analysis of the at-issuance data, the secondary market transactions of firms located in countries that are relatively high in credit risk and suffer from low liquidity are investigated. The remaining analyses use a dummy variable for firms within the high credit risk, low liquidity profile and interact this dummy variable with the sovereign bid-ask spread. The t = [-3, -1] window is used for our non-static explanatory variable. The results are reported in Table 9.

The net institutional transaction activity and total institutional transaction activity are significant at the 1% level. The sovereign CCR also comes in significant at the 5% level. Sovereign bid-ask spread does not come in significant when not interacted with the high credit-risk, low liquidity flag, contrasting to our results for the issuance sample. However, the dummy variable and the interaction term are significant with a positive sign. This indicates that sovereign liquidity is relevant to the yield, but only in situations where sovereign credit-risk is already high. This relevance is amplified in situations where liquidity becomes more scarce, matching our prediction.

Next, the impact of sovereign credit ratings on bound firms compared to non-bound firms is investigated. The results are reported in Table 10. The net and total institutional transaction activity are significant with the correct sign at the 1% level, while the sovereign bid-ask spread is significant at the 5% level. The sovereign credit rating is

Table 9: Determinants of Yield Spreads on Yankee Bonds; Time Series Analysis of Firms in Countries with High Credit Risk and Low Liquidity

The sample consists of Yankee bonds issued from 6/1/2002 to 12/31/2014. Transactions of bonds occur from 6/1/2002 to 12/31/2014. We first take the daily weighted averages of the transactions using volatility as the weight. We then take simple averages across months for all of our variables. Institutional transaction pressure and Yankee bond information are taken from Mergent FISD, and institutional transaction pressure is standardized by the daily simple average of the within month TRACE volume. Rating data is supplemented by data from SDC. Sovereign bid-ask spread is calculated as the difference between ask and bid prices for sovereign debt on Bloomberg. Term spread is the difference between 2-year and 10-year Treasury rates from the Federal Reserve. Exchange rates are taken from the Federal Reserve. Sovereign CCR is calculated as in Gande and Parsley (2005) using Standard and Poor's sovereign long-term credit ratings. Results are winsorized at the 1% and 99% levels. Standard errors are clustered at the individual bond level. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Net transaction activity	**-48.83**
	(11.00)* **
Total transaction activity	**-30.45**
	(9.83)* **
Sovereign bid-ask spread	-39.31
	(45.03)
Sovereign CCR	**-6.12**
	(2.53) **
Credit spread	**-84.28**
	(6.91)* **
Term spread	**66.34**
	(4.83)* **
Log (Offering amount)	4.92
	(8.59)
Log (Maturity)	**119.77**
	(3.89)* **
Log (Exchange Rate)	**23.12**
	(3.84)* **
Callable	**-58.41**
	(10.43)* **
Senior	-26.03
	(21.31)
Low liquidity, high credit risk flag	**31.45**
	(13.75) **
(Low liquidity, high credit risk flag) x Sovereign bid-ask spread	**132.21**
	(70.97)*
N	6,568
R^2	.768

Table 10: Determinants of Yield Spreads on Yankee Bonds; Time Series Analysis of Boundary Firms

The sample consists of Yankee bonds issued from 6/1/2002 to 12/31/2014. Transactions of bonds occur from 6/1/2002 to 12/31/2014. We first take the daily weighted averages of the transactions using volatility as the weight. We then take simple averages across months for all of our variables. Institutional transaction pressure and Yankee bond information are taken from Mergent FISD, and institutional transaction pressure is standardized by the daily simple average of the within month TRACE volume. Rating data is supplemented by data from SDC. Sovereign bid-ask spread is calculated as the difference between ask and bid prices for sovereign debt on Bloomberg. Term spread is the difference between 2-year and 10-year Treasury rates from the Federal Reserve. Exchange rates are taken from the Federal Reserve. Sovereign CCR is calculated as in Gande and Parsley (2005) using Standard and Poor's sovereign long-term credit ratings. Results are winsorized at the 1% and 99% levels. Standard errors are clustered at the individual bond level. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Net transaction activity	**-51.56**
	(10.95)* **
Total transaction activity	**-28.27**
	(9.88)* **
Sovereign Bid-ask spread	**81.35**
	(38.53) **
Sovereign CCR	-2.94
	(3.86)
Credit spread	**-82.14**
	(6.71)* **
Term spread	**68.85**
	(4.73)* **
Log (Offering amount)	5.40
	(8.63)
Log (Maturity)	**119.81**
	(3.98)* **
Log (Exchange Rate)	**24.87**
	(3.97)* **
Callable	**-58.47**
	(10.41)* **
Senior	**-26.85**
	(21.59) *
Boundary firm flag	55.97
	(47.38)
(Boundary firm flag) x sovereign CCR	-2.82
	(3.86)
N	6,568
R^2	.764

insignificant both when measured by itself and when interacted with the dummy variable representing a boundary firm. The coefficients also drop significantly on the sovereign CCR compared to the analysis of firms at issuance. Previously, a one-step increase in the sovereign credit rating would decrease the offering bond yield by approximately 28 basis points for an unbound firm and 34 basis points for a bound firm. The secondary market results indicate that a one-step increase will decrease the yield of an unbound firm by 3 basis points and a bound firm by 6 basis points.

Last, the analysis of public versus private bonds in the secondary market is repeated. We now see that institutional net and total transaction activity is statistically significant for both markets of debt issuance. However, sovereign CCR, which was significant for public bonds but not private bonds at issuance, has reversed; it is now insignificant for public bonds but significant for private bonds at the 1% level. Sovereign bid-ask spread, while previously insignificant, has now also become significant at the 5% level for the public debt issues. The variables of interest become relevant for private bonds in the secondary market, and that the relative importance of sovereign credit and liquidity risks have switched for public issues of Yankee debt.

Table 11: Determinants of Yield Spreads on Yankee Bonds; Time Series Analysis by Private Status

The sample consists of Yankee bonds issued from 6/1/2002 to 12/31/2014. Transactions of bonds occur from 6/1/2002 to 12/31/2014. We first take the daily weighted averages of the transactions using volatility as the weight. We then take simple averages across months for all of our variables. Institutional transaction pressure and Yankee bond information are taken from Mergent FISD, and institutional transaction pressure is standardized by the daily simple average of the within month TRACE volume. Rating data is supplemented by data from SDC. Sovereign bid-ask spread is calculated as the difference between ask and bid prices for sovereign debt on Bloomberg. Term spread is the difference between 2-year and 10-year Treasury rates from the Federal Reserve. Exchange rates are taken from the Federal Reserve. Sovereign CCR is calculated as in Gande and Parsley (2005) using Standard and Poor's sovereign long-term credit ratings. Results are winsorized at the 1% and 99% levels. Standard errors are clustered at the individual bond level. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Public Bonds	Private Bonds
Net transaction activity	**-40.85**	**-94.16**
	(12.07)* **	**(25.92)*** **
Total transaction activity	**-22.08**	**-73.98**
	(12.21)*	**(26.25)*** **
Sovereign Bid-ask spread	**123.21**	26.34
	(48.16) **	(56.81)
Sovereign CCR	-4.38	**-13.65**
	(2.97)	**(4.34)*** **
Credit spread	**-79.38**	**-93.69**
	(7.91)* **	**(9.40)*** **
Term spread	**70.16**	**69.13**
	(5.56)* **	**(8.07)*** **
Log (Offering amount)	15.25	**-10.06**
	(9.77)	**(14.73)** **
Log (Maturity)	**120.79**	**119.77**
	(5.02)* **	**(5.23)*** **
Log (Exchange Rate)	**21.40**	**36.37**
	(4.50)* **	**(7.50)*** **
Callable	**-57.72**	**-44.65**
	(14.44)* **	**(23.68)***
Senior	13.06	**-84.04**
	(38.58)	**(21.17)*** **
N	4,825	1,743
R^2	.744	.809

CHAPTER SIX: CONCLUSION

This study, examines the impacts of institutional net purchasing activity and sovereign credit and liquidity-risk on Yankee bond yields, both at issuance and in the secondary market. The results suggest that, both at issuance and in secondary market transactions, institutional net purchasing activity and sovereign credit ratings are relevant to the determination of the offering yield of Yankee debt. This provides additional evidence that corporate yield spreads incorporate more than simply a default risk premium.

The study adds to the literature that examines the relationship between sovereign credit ratings and corporate yields. Although prior studies have shown that ratings agencies may still instill a sovereign debt ceiling for some firms, or that a sovereign debt downgrade may have an impact on corporate yield spreads, this study directly shows that investors incorporate information contained in the sovereign credit rating into their estimation of the corporate yield spread. The evidence shows that investors are wary of firms domiciled in high credit-risk, low liquidity countries relative to those from lower credit-risk or higher liquidity countries.

Last, the study adds to the literature documenting the relationship between institutional investor transactions and information in the market. Although the majority of this literature focuses on equity markets, this study shows that institutional investors can also create information within the corporate debt market. The evidence shows that insurance companies having significantly high net purchases of prior issues of debt from an issuer is associated with a lower yield on an upcoming issue of Yankee debt from that same issuer.

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APPENDIX: TRACE DATA

The TRACE database includes observations that represent trades that did not actually occur. Trades may be input with errors and need to be corrected, may be cancelled on the trading day or another day in the future, or may have both sides of a trade report the trade. Each observation will have a unique sequence number, coded as MSG_SEQ_NB, for a given CUSIP and date. Original trades are recorded with TRC_ST equal to "T", "G", or "M" depending on the date of the trade. Modifications are recorded with TRC_ST equal to "W", "I", or "O", while cancellations are recorded with TRC_ST equal to "C", "H", or "N". Either a modification or a cancellation will have the same date, recorded as TRD_EXCTN_DT, as the original trade. The modifications and cancellations will also include the original sequence number, coded as ORIG_MSG_SEQ_NB, of the trade they are adjusting. We can match the cancellations and modifications to the original trade using the date, CUSIP of the bond, and the original sequence number. We then eliminate all original observations of trades that are later modified or cancelled. We also eliminate the final observations of trades that are cancelled.

Trades that are cancelled on a future date will be marked as reversals with an ASOF_CD equal to "R". These cannot be matched to the original trade via ORIG_MSG_SEQ_NB the way cancellations and modifications can, as the sequence numbers are only unique within days. Thus reversals must be matched manually using the CUSIP, execution date, execution time, price, volume, reporting party's buy/sell perspective, and the reporting party's type (either dealer or customer). Both observations are eliminated upon a successful match.

We still have remaining reversal observations that are unmatched to our original transaction data. The information for the reversals are manually input to the dataset by traders, so it is possible that they did not report an exact match on the trade execution time. Thus we match reversals to our original trades database using CUSIP, execution date, price, volume, reporting party's buy/sell perspective, and the reporting party's type. We again eliminate both observations upon a successful match. The remaining reversals that are unmatched are subsequently removed from our database without matching to an original trade.