The Determinants of Yankee Bond Pricing

Jeffrey Lyon

Tao-Hsien “Dolly” King

University of North Carolina at Charlotte

This draft: September 2016

The Determinants of Yankee Bond Pricing

Abstract

Yankee bonds provide a unique arena to analyze corporate debt issuance. Previous studies, such as Miller and Puthenpurackal (2002) and Miller and Reisel (2011) have used Yankee bonds to analyze the impact of differing levels of investor protection across countries on the yields and design of corporate debt. In this paper we will use Yankee bonds to assess the impact of sovereign credit and liquidity-risks and institutional buying and selling pressure on the yields demanded by investors of corporate debt. To our knowledge, we are the first paper to attempt to disentangle the impacts of sovereign level credit and liquidity-risk on corporate yield spreads, as well as the first to assess the influence of trading pressure of institutional investors. Our main sample consists of 788 Yankee bonds issued between 2002 and 2014 by corporations residing in 16 different countries. Results indicate that sovereign credit-risk dominates liquidity-risk, institutional buying pressure holds more significance than institutional selling pressure at issuance, and that institutional selling pressure dominates institutional buying pressure for subsequent transactions.

I. 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 public Yankee bond market is more attractive for issuers due to its larger set of investors. Companies that issue in the Rule 144A market, therefore, tend to be smaller and more risky 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 subject to less regulation.

Yankee bonds give researchers a unique environment to test hypotheses across countries. For example, Miller and Reisel (2011) and Qi, Roth, and Wald (2011) explore the investor protection 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]

Yankee bonds being issued in the same market despite the issuing companies being domiciled in a variety of countries allows us to achieve a level of homogeneity that is impossible when looking at issuances of international debt that occur only within the country of the issuer. Two particular areas of interest that we wish to investigate are the impact of institutional buying and selling pressure and the relative importance of the domicile of an issuer's sovereign credit- and liquidity-risk on corporate bond yields. Institutional investors are known to be sophisticated investors, so it is possible that bond yields respond to price pressure effects stemming specifically from the purchases and sales of institutional investors. Institutional investors also tend to be the primary investors in international corporate debt, indicating that their purchasing behavior will be more predictive than the market as a whole.

Second, we believe that the economic situation in the home country of an international issuer is something for which investors will adjust. Either tighter credit markets or slower liquidity markets may make it more difficult for an international corporation to repay its debt. One possible way to proxy for both of these effects simultaneously would be to include the sovereign yield of the country where the corporation is domiciled. We will attempt to go a step further and separate the sovereign credit- and liquidity-effects to investigate which of these has a larger impact on the yields that investors demand.

In this article, we will first look at the factors that impact spreads of Yankee bonds above maturity matched Treasury bonds on the offering date of the issue. One concern would be that institutional buying and selling pressure may not have any impact on the determination of the

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

offering price if the price is chosen in a significant amount of time in advance, akin to an initial public offering. This is not, however, the case in the Yankee bond market. The offering price is typically chosen after market close on the day before the offering goes live.[2] This price flexibility leads us to expect to find that institutional buying pressure will have an impact on the offering yield because a new bond issue in a market with high institutional demand will command a higher price. Institutional selling pressure, however, will likely not be as impactful on the offering yield as institutional investors will not yet have bonds of the new issue to sell. We further expect that sovereign credit-risk will have a larger impact than sovereign liquidity-risk, as it is easier for investors to witness the credit-risk of a sovereign entity than its liquidity-risk in the market.

We will continue by repeating this analysis for subsequent transactions of our Yankee bonds after the issuance date. The variables that impact transaction yields are similar to those that impact a bond's yield at offering. One notable difference, however, is that general institutional selling pressure may now include selling pressure of issues of the Yankee bonds we examine, causing institutional selling pressure to become more relevant. The inclusion of the transaction data helps to bolster our sample size, as our original sample of at-issuance yields is a relatively small 788 bonds. We combine all of the transactions for a given bond into bond-month observations, resulting in 10,756 observations.

Our results show that institutional buying pressure plays a significant role in the offering yield of Yankee bonds, while institutional selling pressure does not. This is likely due to the increased level of institutional demand in the market causing greater demand for the individual Yankee issue. We also find that sovereign credit-risk is significantly more impactful than

[2] Despite the proximity to the offering date with which the offering price is chosen, it is not possible for issuers to attempt to time the market with a debt offering when buying pressure is high. The registration process for a new issue can take several months. See Resnick (2012) for a more complete description.

sovereign liquidity-risk for the offering yield of the bond, coming in significant at the 5% level throughout our specifications. When analyzing subsequent transactions, sovereign credit and liquidity-risk and institutional selling pressure all play a significant role. However, institutional buying pressure does not have a significant impact.

We contribute to the literature by providing additional evidence of the differing importance of credit and liquidity-risk at the sovereign level for a corporate bond issuer. There is a notable literature attempting to disentangle credit and liquidity-risk for individual yields (e.g. Longstaff, Mithal, and Neis (2005), Driessen (2005), Covitz and Downing (2007), Beber, Brandt, and Kavajecz (2009), Kalimipalli and Nayak (2012), Monfort and Renne (2013), Schwarz (2014). The common aim of this literature is to either disentangle the credit and liquidity effects at the corporate level on corporate spreads or at the sovereign level on sovereign yield spreads. The common result is that credit-risk dominates liquidity-risk, though liquidity-risk plays a nontrivial role (Beber, Brandt, Kavajecz (2009)).[3]

We also contribute to the literature by expanding on the impacts of institutional buying and selling pressure on corporate bonds. Schultz (2001) examines institutional corporate bond trades to estimate trading costs for investment-grade bonds in the over-the-counter market. Bessembinder, Maxwell, and Venkataraman (2006) investigates the trade execution costs for insurance company transactions in corporate bonds before and after the introduction of transaction reporting for corporate bonds through TRACE. Ellul, Jotikasthira, and Lundblad (2011) examines fire sales of downgraded corporate bonds caused by regulatory constraints imposed on insurance companies. Chakravarty and Sarkar (2003) examine the bid-ask spread paid by insurance companies when trading government, municipal, and corporate bonds.

[3] An outlier in this regard is Schwarz (2014), which finds that interbank sovereign bond spreads are driven 1.5 to 3 times more by liquidity than by credit.

The remainder of the paper is organized as follows. Section II describes how we obtain our data and the characteristics of our sample. Section III explains the process with which we create our variables we use to test. Section IV presents and discusses our empirical analysis. We will begin by detailing our empirical methodology. We will then explore the yields of Yankee bonds at issuance and then expand the analysis to subsamples of the issuance data, time series data, and subsamples of the time series data. Section V concludes.

II. Data Sources and Sample Construction

Our main sample of Yankee bonds is gathered from the Mergent's Fixed Income Securities Database (FISD) database. FISD provides a high level of detail on the individual bond issues and is frequently used in the literature when examining Yankee bonds (e.g. Miller and Reisel (2011), Huang et al. (2013)). We begin with all Yankee bonds issued between July 1st, 2002 and December 31st, 2014. This initial sample yields 38,320 bonds. We exclude medium-term-notes from our sample as a dominant number of observations are issued by a paltry number of issuers. This reduces our sample to 3,825 bonds. We then eliminate bonds with special features such as payment-in-kind or convertible, further reducing our sample to 3,661 bonds. We next eliminate government bonds and supranationals because they have different risk profiles than corporate entities, reducing our sample to 3,193 bonds. We follow this by eliminating non-fixed rate bonds, as we are interested in measuring the yields of the bonds. This reduces our sample to 2,792 bonds. We then eliminate bonds for which we do not have an offering yield nor enough information to determine the offering yield, reducing our sample to 2,361 bonds. We eliminate bonds for which we do not have sovereign credit or liquidity data, reducing our sample to 918 bonds. Finally, we eliminate foreign agency bonds, reducing our sample to 788 bonds. We also collect subsequent

transactions of these bonds after the offering date in both the TRACE and NAIC databases through Mergent's FISD. We attempt to control for duplicate observations by matching across datasets by CUSIP, transaction date, transaction volume, and transaction price.

It should be noted that two complications arise when matching the TRACE and NAIC databases. First, TRACE is a self-reported database, so we may miss duplicate observations as a result 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. We recognize that this will bias our treasury spread data by underweighting observations reported in TRACE with a transaction volume above the reporting cap. However, we do not feel that this will significantly affect our results as the yields on a particular day tend to be similar and only 4.89% (93,956 of 1,922,906) of our transactions are affected by the TRACE volume reporting cap.

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

We want to measure the impact on institutional buying and selling pressure on the prices of bonds, so we need to determine an appropriate proxy for the amount of institutional buying and selling pressure in the U.S. bond market at any given time. We proxy for institutional buying and selling pressure using data on insurance companies taken from the National Association of

Insurance Commissioners (NAIC) on Mergent's FISD. The insurance companies in the NAIC database are used to proxy for institutional investors in Schultz (2001) and Bessembinder, Maxwell, and Venkataraman (2006). Additionally, Schultz (2001) and Campbell and Taksler (2003) estimate that insurance companies hold roughly one third of corporate bonds.

We gather our credit ratings for the individual corporate issues through Mergent's FISD. We use Moody's ratings at bond issuance and supplement with Standard & Poor's if we are missing data from Moody's. We supplement missing data with ratings pulled from Thompson Reuter's SDC Platinum. We follow Miller and Puthenpurackal (2002) and include the log of the foreign exchange rate, as changes in the foreign exchange rate may impact an investor's belief that a foreign corporation can pay their interest payments on time. We gather our data on foreign exchange rates from the Federal Reserve Bank through Wharton Research Data Services. We also adhere to common practice when analyzing bond yields and control for the credit spread and term spread. We use the difference between Bank of America AAA and BBB corporate indices collected on Datastream for our credit spread. We use the difference between two- and ten-year Treasury rates, collected from the Federal Reserve Bank, as our term spread.

Descriptive statistics for our initial dataset can be seen in Table 1. Panel A shows that the majority of our bonds occur after the financial crisis, though we do have a small number occurring both before and during the crisis. This is a combined result of the increased frequency of Yankee bond issuance over time and limitations to our sovereign liquidity data. Panel B indicates that the majority of our bonds are European and come from developed countries. Developing countries comprise only 107 bonds in our sample, or 13.58%. Meanwhile, European countries comprise 624 bonds in our sample, or 79.19%. Panel C shows that nearly half our bonds have a maturity between 5 and 10 years, with slightly more than a third having maturities of more than ten years. Panel D

shows that most of our issuers received an investment grade in their debt. Of our issuers, 559 were able to receive a rating of BBB or better, 61.17% of our sample. Only 130 bonds, or 16.50% of our sample, did not have a rating available. Panel E shows that we have more than half our bonds as being Rule 144A private placements and roughly two-thirds of our bonds being callable. Only one bond in our dataset is attached to a sinking fund. The vast majority of our bonds are also senior status.

[INSERT TABLE 1 HERE]

III. Construction of Main Variables

Our 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. We manually calculate the Treasury spread over the nearest annual Treasury bond in these situations, linearly interpolating between Treasury maturities. Data on the historical yield curve is gathered from the Federal Reserve Bank. We repeat these steps for our analysis of the subsequent transactions of bonds, except we linearly interpolate between Treasury maturities at the monthly level.

We must make an adjustment when dealing with our time series data for the fact that we will have multiple observations for a given day. We account for this by aggregating all of the transactions from a single day 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*. We use the volume of the individual transactions as the weight. We then further compress our data by taking the simple average of our control variables across months for our time series regressions and compare these

values to the final daily bond observation for a given month. This step helps alleviate any issues arising from our control variables and dependent variable being contemporaneously determined.

To create our measure of sovereign credit-risk, we follow Gande and Parsley (2005) and calculate a comprehensive credit rating (CCR) using sovereign credit ratings.[4] Ratings from B- to AAA are initially coded from 1 to 16, with ratings below B- coded as 0. We subtract one from the rating if the credit outlook for a country is rated as negative, and we subtract 0.5 from the rating if the credit outlook is credit watch – negative. We make similar positive adjustments 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. For sovereign liquidity-risk, we use the proxy of the bid-ask spread of the sovereign debt. Bid-ask spreads are a common tool to use when looking at the liquidity of an individual bond. However, we are using it to proxy for the overall liquidity environment within a country.[5] We calculate the sovereign bid-ask spread as the difference between the daily bid and ask prices for the sovereign debt on Bloomberg, where available.

We gather the institutional buying and selling pressure by aggregating the total dollar value of all purchases and sales by insurance companies on a given day. We calculate the buying and selling pressure at both three and five day windows centered on the issuance date to help smooth the volatility of the two series. We attempt three methods of standardizing the buying and selling pressure: first, we simply take the natural logs of the institutional buying and selling pressure. Second, we standardize the institutional trading pressure by dividing by the total volume of

[4] 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.

[5] 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.

transactions in the debt market. We gather this data from the trades self-reported by debt traders in the TRACE database. We must clean the TRACE database's transactions before using it for this purpose. The details on how the database is cleaned is contained in Appendix I. Finally, we standardize the data by dividing by the number of unique transactions in the debt market. This data is also gathered via the self-reported TRACE database.

IV. Empirical Analysis

A. Yield Spreads at Issuance

Our univariate results are displayed in Table 2. Panel A shows that our sample is significantly weighted towards bonds issued after the financial crisis.[6] We see an expected increase in spreads during and immediately following the crisis with a decline in spreads as we move into 2011 and beyond. Panel B shows the home domiciles of the issuers of our Yankee bonds. We can see that some countries are home to very safe issuers (e.g. Norway has a mean treasury spread of 165.0801) while others are home to very unsafe issuers (e.g. issuers in Greece have a mean treasury spread of 624, or issuers in Indonesia with a mean treasury spread of 576.9517). Panel C separates our sample by sovereign CCR, our measure of sovereign credit-risk. As we would expect, we have a consistent trend of higher quality borrowers originating from countries with lower sovereign credit-risk.[7] Panel D looks at how treasury spreads vary across the quintiles of countries sorted by the bid-ask spread of their sovereign debt, our measure of sovereign liquidity. The first quintile, where our 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

[6] This is partially due to our data limitations in sovereign level data before the financial crisis.
[7] We have an odd result that bonds issued by companies domiciled in countries with a CCR of four or less have a much lower average treasury spread than bonds issued by companies domiciled in countries with a CCR of five or six. We believe this to be an aberration due to the small sample size within these buckets.

do not show much variation, we see 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 total buying pressure on the day of the issuance. We see that we do have a connection between the buying pressure and the spread at issuance, with more buying pressure from institutional investors being correlated with higher yield spreads for Yankee bonds. Panel F shows that selling pressure, however, does not have the same relationship. There is no strong pattern connecting the selling pressure and the at-issuance treasury spreads.

[INSERT TABLE 2 HERE]

For our multivariate analysis we use a model where the at-issuance spread is the dependent variable. We attempt 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. We including firm and year fixed effects in our models. The model is estimated using ordinary least squares with standard errors clustered at the firm-issuer level as follows:

$$\begin{aligned} \mathrm{YLDSPD_i} = {} & \beta_0 + \beta_1 \mathrm{TestVariables} + \beta_2(\mathrm{CRED}) + \beta_3(\mathrm{TERM}) + \beta_4(\mathrm{AMT}) \\ & + \beta_5(\mathrm{MAT}) + \beta_6(\mathrm{FX}) + \beta_7 \mathrm{CALL} + \beta_8 \mathrm{SE} + \beta_9 \mathrm{RULE144A} \\ & + \beta\_10\ \mathrm{INVEST} \end{aligned} \quad (1)$$

We define *YLDSPD* to be the at-issuance spread between the yield of the bond and the closest maturity-matched U.S. Treasury. Our main test 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

natural log of the difference between the Bank of America AAA and BBB corporate indices. *TERM* is the natural log of 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 identifier variable that is equal to 1 if the issue has a call provision attached to it and 0 otherwise. *SEN* is an identifier variable that is equal to 1 if the bond has senior status and 0 otherwise. *RULE144A* is an identifier variable that is equal to 1 if the bond is issued using Rule 144A of the SEC and 0 otherwise. *INVEST* is an identifier variable that is equal to 1 if the bond has investment grade status for its credit rating and 0 otherwise.

Our control variables have been commonly used in the literature before so we will only provide a limited discussion on them. We include the credit spread and term spread to help account for overall macroeconomic conditions at the time of issuance. The term spread will proxy for the slope of the term structure and the credit spread will proxy for the current credit-risk premium in the United States debt market. 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 we expect the sign on the foreign exchange volatility to be positive. We expect that bonds with senior status will command lower yields due to their relatively lower risk. Previous studies have shown (e.g. Huang et al. (2013), Resnick (2012), and Chaplinsky and Ramchand (2004)) that Rule 144A private placements have

higher yields than Yankee bonds. We further expect that investment grade bonds will have lower yields than high-yield bonds.

Table 3 contains our initial multivariate results for treasury spreads using our three day window centered on the offering date for institutional buying and selling pressure. We see in our first model that the institutional buying pressure is significant at the 1% level, while the institutional selling pressure is insignificant. In our second model, we find that the institutional buying pressure is significant at the 5% level, while the institutional selling pressure remains insignificant. Finally, in our third model, Institutional buying pressure remains significant at the 5% level, while institutional selling pressure remains insignificant. Sovereign credit-risk is significant at the 5% level across all three models, while sovereign liquidity-risk is insignificant in all models. Thus our early results indicate that institutional buying pressure and sovereign credit-risk play a larger part in determining credit spreads than institutional selling pressure or sovereign liquidity-risk.

[INSERT TABLE 3 HERE]

Our results are consistent with the previous literature showing that credit-risk is more important for valuing bonds than liquidity-risk.[8] However, our results do not indicate the relative importance of sovereign liquidity on corporate bond issues. Despite this, we are not comfortable in saying that sovereign liquidity has no impact on at-issuance corporate yield spreads. It is possible that our proxies of sovereign credit and liquidity-risk are noisy enough that we are unable to find any significance at all for sovereign liquidity-risk despite its importance. Our results are

[8] For example, Beber, Brandt, and Kavajecz (2009) or Longstaff, Mithal, and Neis (2005).

indicating, however, that sovereign credit-risk has obvious importance and is more relevant to investors than sovereign liquidity.

We further examine how robust our findings are by expanding the window of our institutional buying and selling pressure variables to five days. Table 4 contains the results of these regressions. Similar to our results in Table 3, we standardize the institutional buying and selling pressure using logarithms, the total volume of trades during the window, and the total number of trades during the window for the models contained in Table 4. Our results are consistent with those reported in Table 3: institutional buying pressure remains significant at either the 1% or 5% level depending on our method of standardization, while sovereign credit-risk is significant at the 5% level in all three models.

[INSERT TABLE 4 HERE]

B. Extended Analysis for Issuance Yield Spreads

We expand our base case by including two other possible influences on Yankee yield spreads: bondholder rights in the issuing firm's home domicile and non-Yankee issuances by our issuers. We proxy for bondholder rights by using the creditor rights index created by Djankov et al. (2007). One possible problem is that the last year that data is available for the index is 2003 and our sample runs from 2003 to 2014. However, Djankov et al. (2007) notes that the index values are very consistent throughout time, with a correlation of 0.95 between the 2003 and 1978 creditor rights indices. We use the 2003 values of the index for every year in our sample.

We use the SDC Platinum global issues database to find all debt issuances by issuers within our sample matched by 6-digit CUSIP. These issuances are then checked for matches to bonds in our 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. We then create a flag for any bond whose issuer has an international debt issuance within one month of the Yankee bond in our sample, a variable for the total number of international issuances, and a variable calculating the percent of the offering amount of the international issuance relative to the combined offering amount of the international issuances and the bond in our sample. We find that 87 of our 788 bonds in our sample have at least one such international issuance.

The results of our first extension are contained in Table 5. We need to choose a consistent way of standardizing our international buying and selling pressure. We choose the three-day window of trading pressure standardized by the total volume of trades in the debt market, as we feel that this measure best captures the relative trading pressure of institutional investors. For our first specification, we drop our country fixed effects and replace them with the Djankov et al. (2007) creditor rights index. Interestingly, the creditor rights index is significant at the 1% level with a positive sign, indicating that investors pay a premium for bonds being issued from countries with lower creditor rights. Our subsequent results show that our flag if the issuer has an international issuance is insignificant on its own or when joined by the number of international issuances within one month of our bond. We do find that both our flag and the relative amount of international issuance are significant with opposite signs when including both variables. The size and sign of the coefficients indicate that an international issuance roughly the same size as the Yankee bond offering amount will have minimal impact. However, as the size of the international issuances within one month of our Yankee bond issue increases, the yield spread demanded by investors will decrease. This could be due to firms with more international issuances being more

visible to investors than those without, causing investors to be more comfortable with the company.

[INSERT TABLE 5 HERE]

We next expand our analysis on our issuance data by splitting our sample and testing within subsamples of our data. We begin by examining the difference in the determinants of investment-grade Yankee bonds and high-yield Yankee bonds. We expect to find that our explanatory variables are stronger in our high-yield bond sample than our investment-grade sample. This is due to the fact that high-yield bonds carry more credit-risk for investors. This increased credit-risk causes investors to be more sensitive to major corporate events or changes in policy. We expect that similar logic will cause investors in high-yield debt to be more sensitive to differences in the traits of the bonds.

The results of our analysis of investment grade and high-yield bonds is in Table 6. Sovereign credit risk remains impactful for investment grade bonds, coming in significant at the 1% level, though institutional buying pressure does not. Conversely, neither sovereign credit nor liquidity risk are significant for our high-yield bonds subsample. We do have that both institutional buying and institutional selling pressure are significant at the 1% and 10% level, respectively, with the expected signs.

It is notable that Rule 144A bonds have significantly higher yields in our high-yield bond subsample while not for our investment grade sample. This is counter to the result found in Chaplinsky and Ramchand (2004), that Rule 144A firms had significantly higher yields in the investment grade market but not in the high-yield market. Our subsample of high-yield bonds includes 277 Rule 144A private placements and 59 public debt issues, while our subsample of investment grade bonds includes 203 Rule 144A private placements and 279 public debt issues.

This indicates that we are seeing a similar bifurcation of the market as reported in Chaplinsky and Ramchand (2004), with high quality firms issuing in both the public debt market and the private Rule 144A market. Contrary to their results, we find that these high quality firms are able to generate similar yields in both markets. Low quality firms, however, generally issue in the private Rule 144A market unless they are able to convince investors of their quality and generate significantly lower yields in the public debt market.

[INSERT TABLE 6 HERE]

Our results indicate that investors, when purchasing investment-grade Yankee debt, are less sensitive to the traits of the bond but remain sensitive to the overall macroeconomic conditions surrounding the issue. The credit-risk inherent to the home domicile of the issuer and the current credit-risk premia in the market are significant at the 1% level, and the log of the 30 day historical volatility of the exchange rate is significant at the 5% level. None of these market level variables holds significance in our high-yield subsample. A bond being callable, being a Rule 144A private placement, or having a larger offering amount has an impact on the yields of our high-yield bonds but not our investment-grade bonds. This is in line with our hypothesis that investors in high-yield bonds will be more sensitive to the traits of the individual bonds due to the increased amount of credit-risk associated with these bonds.

We next analyze the impact of sovereign liquidity on our issuance data. We expect that the Yankee bonds being issued from countries with less (more) sovereign liquidity will result in a higher (lower) impact of institutional trading. This is because a bond coming from a less liquid environment will be more susceptible to trading pressures than bond from a more liquid environment. We examine this by repeating our earlier regressions for Yankee bonds issued from

domiciles that rank in the top and bottom quintile of the bid-ask spread of their home domicile's sovereign debt. The results are in Table 7.

The result of the regressions show that institutional selling pressure plays a significant role in both the top and bottom quintiles of sovereign liquidity pressure, with institutional buying pressure also playing a minor role in the most liquid countries. We note that sovereign credit risk becomes insignificant in both of our subsamples of sovereign liquidity risk. It is possible that this is being driven by a lack of variation for our most liquid countries. Of the 180 bonds, 90.56% have a comprehensive credit rating of 15 or 16, with the remaining having a comprehensive credit rating of 13 or 14. This, however, should not be an issue for our least liquid countries, as we have a more random draw across the sovereign comprehensive credit ratings within that group.

The results for our other control variables are also notable. Investors are willing to pay more for bonds coming from illiquid countries with high maturities, but then also demand a premium for bonds with a call provision. In contrast to this, we see that investors of bonds coming from very liquid countries will pay less for bonds with a high maturity, but are unaffected by a call provision. We are unable to comment on the impact senior status has on Yankee bonds from very illiquid countries as all of the bonds in our bottom sovereign liquidity quintile have senior status.

We also note that Rule 144A bonds have a significantly higher yield regardless of the liquidity of the home issuer, though the relationship is stronger when the home issuer is very liquid. Previous studies [9] have argued that Rule 144A bonds should have higher yields because there are fewer buyers in the 144A market relative to the public market, causing the bonds to have less liquidity. Our results indicate that this is especially true when looking at sovereign entities that

[9] For example, Chaplinksy and Ramchand (2004), Resnick (2012), or Huang et al. (2013).

are very liquid, but that the evidence is less strong when looking at countries that are themselves illiquid.

[INSERT TABLE 7 HERE]

Our final subsample analysis examines the difference between public debt and private Rule 144A debt. An immediate reaction is that institutional transaction pressure 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, our insurance companies do meet this definition, indicating that our institutional transaction pressure can have an impact on Rule 144A debt. The results are contained in Table 8.

We find that the determinants of public and private debt are very similar. Institutional buying pressure is significant at the 1% and 5% level for public and private debt, respectively, while sovereign credit risk is significant at the 1% and 10% level. Investors are willing to accept a lower yield for a larger offering amount on the bond, indicating that the bond is either providing the issuer with liquidity or that a larger issue is creating more name recognition for the issuer among investors. The relationship is stronger and larger for Rule 144A bonds, which tend to be smaller and riskier issuers than public Yankee debt issuers. We also see that private debt issuers can decrease the yield demanded by investors by issuing large amounts of international debt, again indicating that investors are willing to accept lower yields from companies that they either are more familiar with or that they feel have more liquidity from their recent issuances.

[INSERT TABLE 8 HERE]

C. Time Series Results

We further analyze the impact of sovereign credit- and liquidity-risk as well as institutional buying and selling pressure by looking at the transaction data for our bonds. 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 future transactions. We begin by gathering transaction data for our 788 Yankee bonds from both NAIC and TRACE. TRACE data requires an additional cleaning step that is detailed in Appendix I. We take the weighted average of the daily transactions using the volume as the weight and select the last daily observation within the month as the bond-month transaction spread. We then take the simple average of all of our variables across months and regress the average treasury spread for bond *i* at the end of month *t* to the simple average of our explanatory variables in month *t*. We standardize our institutional transaction pressure by dividing by the simple average of the daily total TRACE transaction volume within the month. 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.[10] The initial results are included in Table 9.

Our results indicate that sovereign credit and liquidity-risk and institutional selling pressure are more relevant to the transaction yields of Yankee bonds than the institutional buying pressure.[11] The bid-ask spread on sovereign debt, the sovereign CCR, and institutional selling pressure are all significant at the 1% level, while institutional buying pressure is insignificant. The credit spread, term spread, offering amount, maturity, the exchange rate, and the identifier for investment grade

[10] 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.
[11] The results in our time series data are all 90% winsorized within their respective sample. For robustness, we also tested our main sample using 98% winsorization and no winsorization and achieved similar results. We also standardized the institutional trading pressure with logs instead of the volume in the TRACE database and found similar results as long as we used either a 90% or 98% winsorization.

all come in significant with the expected sign at the 1% level. The log of the 30 day historical volatility of the exchange rate being significant for our transaction data but not our issuance data indicates that investors are more concerned with the possible increase in difficulty of an issuer being able to pay their coupon payments resulting in exchange rate costs when dealing with subsequent, after-issue bond transactions.

[INSERT TABLE 9 HERE]

Our time series results vary slightly with our results from our issuance data. The main example of this is that institutional buying pressure was consistently significant in our issuance data with institutional selling pressure failing to show significance, but their roles are reversed for our transaction data. One possible explanation for this is that we are picking up the fire sale effect documented in Ellul, Jotikasthira, and Lundblad (2012). The authors note that a lack of counterparties for insurance companies can cause temporary price declines for bonds subject to regulatory-induced selling following a downgrade. Such a situation will not arise upon the issuance of a bond, creating the possibility that institutional selling pressure will have a larger effect on subsequent transactions than upon issuance. We expand our analysis by investigating our model using just investment grade and high yield debt.

We see that our results become even stronger when looking solely at investment grade debt. All of our variables of interest become significant at the 1% level. We further see that our control variables remain significant, excluding our flag denoting a private placement. These results are significantly stronger than our original examination of issuance data for investment grade debt. This is in line with our expectations, as institutional buying and selling pressure is more likely to have an impact on the yield of the subsequent transactions of our bonds than their offering yield. This does not apply, however, to our high yield bonds. Our high yield subsample

has only sovereign liquidity as significant with institutional buying and selling pressure not having a discernible impact on transaction yields. This is surprising, as insurance companies have long been investors in the private placement bonds that are frequently used by risky borrowers. We also see that Rule 144A private placement bonds do not generate a significantly higher yield inside of our high yield sample, contradictory to our finding at issuance.

We follow our original analysis of the at-issuance data by examining the top and bottom quintiles of sovereign liquidity. The results are in Table 10. We see that neither institutional buying nor selling pressure is significant for our most liquid countries, nor is sovereign credit risk. We do find, however, that our sovereign liquidity risk is significant at the 1% level with the incorrect sign. This is likely due to the fact that we have minimal variation between countries within this subsample. 57 of our 2136 bond-month pairs within the subsample are originated from Germany, with another 130 from France and 1949 from Great Britain. Our results return to expectation when looking at the most illiquid sovereign quintile. We find that both institutional buying and selling pressure have a significant impact on bond spreads, matching our result from our at-issuance sample. This again confirms to our expectation that institutional buying and selling pressure will have a larger impact when looking at a sovereign environment that is less liquid.

[INSERT TABLE 10 HERE]

Finally we look at the difference between transactions of public and private issuances of Yankee debt. The results are in Table 11. We find that institutional selling pressure, sovereign liquidity risk, and sovereign credit risk are significant for both subsamples. Although our determinants of yields are different from our at-issuance analysis, we again find that the determinants between the public and private issuances of Yankee debt are similar. One notable exception is that investors seem to value the protection of senior status more for private debt than

public debt, as we fail to find a premia for senior bonds in our public debt sample. We also see that the log of the offering amount is significant for our private bonds, again indicating that investors may be willing to pay a premia for bonds that they either recognize or feel are less risky due to the increased liquidity generated by the original issuance. This benefit is less relevant to the larger and safer issuers that tend to utilize the public Yankee bond market.

[INSERT TABLE 10 HERE]

V. Conclusion

In this article, we attempt to measure the impact of institutional buying and selling pressure and sovereign credit and liquidity-risk on Yankee bond yields, both at issuance and for subsequent transactions. We find that, at issuance, the sovereign credit-risk and institutional buying pressure are the most important of the four variables. Institutional selling pressure holds explanatory power in some subsamples, but sovereign liquidity risk is consistently insignificant. Counter to Chaplinksy and Ramchand (2004), we find that low quality issuers are able to obtain a significantly lower yield in the public market than the Rule 144A market if they are able to otherwise convey their creditworthiness.

We expand our analysis to the subsequent transactions of our Yankee bonds. Here we find that the sovereign credit and liquidity-risk along with institutional selling pressure all play a significant role in the pricing of the Yankee bonds. The inclusion of institutional selling pressure is likely due to the effect of fire sales of insurance companies found in Ellul, Jotikasthira, and Lundblad (2011).

We further the literature by providing additional evidence of institutional buying and selling pressure affecting the yields of international corporate U.S. debt issues. We also provide

more information on the separate effects of sovereign credit and liquidity-risks, showing that sovereign credit-risk plays a larger role in the determination of at-issuance spreads than liquidity-risk. We build on the literature attempting to discern what factors impact the spreads of Yankee issues, both at-issuance and for subsequent transactions.

References

Ahearne, Alan G., William L. Griever, and Francis E. Warnock. "Information costs and home bias: an analysis of US holdings of foreign equities." *Journal of International Economics* 62.2 (2004): 313-336.

Batten, Jonathan, Thomas Fetherston, and Pongsak Hoontrakul. "Modelling the Credit Spreads and Long–Term Relationships of Thai Yankee Bond Issues." *Asian Economic Journal* 16.4 (2002): 379-397.

Batten, Jonathan A., Thomas A. Fetherston, and Pongsak Hoontrakul. "Factors affecting the yields of emerging market issuers: Evidence from the Asia-Pacific region." *Journal of International Financial Markets, Institutions and Money* 16.1 (2006): 57-70.

Beber, Alessandro, Michael W. Brandt, and Kenneth A. Kavajecz. "Flight-to-Quality or Flight-to-Liquidity? Evidence from the Euro-Area Bond Market." *Review of Financial Studies* 22.3 (2009): 925-957.

Bessembinder, Hendrik, William Maxwell, and Kumar Venkataraman. "Optimal market transparency: Evidence from the initiation of trade reporting in corporate bonds." *Journal of Financial Economics* 82.2 (2006): 251-288.

Cai, Kelly Nianyun, and Hui Zhu. "The market reaction to Yankee and Rule 144A bond offerings." *Journal of Multinational Financial Management* (2016).

Campbell, John Y., and Glen B. Taksler. "Equity Volatility and Corporate Bond Yields." *The Journal of Finance* 58.6 (2003): 2321-2350.

Chakravarty, Sugato, and Asani Sarkar. "Trading Costs in Three U.S. Bond Markets." *The Journal of Fixed Income* 13.1 (2003): 39-48.

Chaplinsky, Susan, and Latha Ramchand. "The Impact of SEC Rule 144A on Corporate Debt Issuance by International Firms." *The Journal of Business* 77.4 (2004): 1073-1098.

Covitz, Dan, and Chris Downing. "Liquidity or Credit-risk? The Determinants of Very Short-Term Corporate Yield Spreads." *The Journal of Finance* 62.5 (2007): 2303-2328.

Djankov, Simeon, Caralee McLiesh, and Andrei Shleifer. "Private credit in 127 countries." *Journal of Financial Economics* 84 (2007): 299-329.

Driessen, Joost. "Is default event risk priced in corporate bonds?" *Review of Financial Studies* 18.1 (2005): 165-195.

Ellul, Andrew, Chotibhak Jotikasthira, and Christian T. Lundblad. "Regulatory Pressure and Fire Sales in the Corporate Bond Market." *Journal of Financial Economics* 101.3 (2011): 596-620.

Gande, Amar, and David C. Parsley. "News spillovers in the sovereign debt market." *Journal of Financial Economics* 75.3 (2005): 691-734.

Huang, Alan G., Madhu Kalimipalli, Subhankar Nayak, and Latha Ramchand. "Pricing of International Private Debt: Evidence from the US secondary bond market." *Unpublished working paper. Wilfrid Laurier University, Waterloo and NYU–Salomon Research Center* (2013).

Kalimipalli, Madhu, and Subhankar Nayak. "Idiosyncratic Volatility vs. Liquidity? Evidence from the U.S. Corporate Bond Market." *Journal of Financial Intermediation* 21.2 (2012): 217-242.

Liu, Edith. "Diversifying Credit Risk with International Corporate Bonds." *Work. Pap., Cornell Univ* (2010).

Longstaff, Francis A., Sanjay Mithal, and Eric Neis. "Corporate Yield Spreads: Default Risk or Liquidity? New Evidence from the Credit Default Swap Market." *The Journal of Finance* 60.5 (2005): 2213-2253.

Miller, Darius P., and John J. Puthenpurackal. "The Costs, Wealth Effects, and Determinants of International Capital Raising: Evidence from Public Yankee Bonds." *Journal of Financial Intermediation* 11.4 (2002): 455-485.

Miller, Darius P., and Natalia Reisel. "Do Country-Level Investor Protections Affect Security-Level Contract Design? Evidence from Foreign Bond Covenants." *Review of Financial Studies* (2011): 408-438.

Monfort, Alain, and Jean-Paul Renne. "Decomposing Euro-Area Sovereign Spreads: Credit and Liquidity Risks." *Review of Finance* 18.6 (2014): 2103-2151.

Qi, Yaxuan, Lukas Roth, and John K. Wald. "How legal environments affect the use of bond covenants." *Journal of International Business Studies* 42.2 (2011): 235-262.

Resnick, Bruce G. "Investor yield and gross underwriting spread comparisons among U.S. dollar domestic, Yankee, Eurodollar, and global bonds." *Journal of International Money and Finance* 31.2 (2012): 445-463.

Schultz, Paul. "Corporate Bond Trading Costs: A Peek Behind the Curtain." *The Journal of Finance* 56.2 (2001): 677-698.

Schwarz, Krista. "Mind the Gap: Disentangling Credit and Liquidity in Risk Spreads." *Available at SSRN 1486240* (2014).

Appendix I: 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 trades 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.

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 Poors sovereign long-term credit ratings.

	Number	Percentage
Panel A: Offering Year		
2003	3	0.38
2004	5	0.63
2005	5	0.63
2006	20	2.54
2007	14	1.78
2008	28	3.55
2009	101	12.82
2010	95	12.06
2011	112	14.21
2012	151	19.16
2013	127	16.12
2014	127	16.12
Total	**788**	**100.00**
Panel B: Country		
Austria	6	0.76
China	86	10.91
Germany	24	3.05
Spain	22	2.79
France	104	13.20
United Kingdom	249	31.60
Greece	5	0.63
Indonesia	19	2.41
Ireland	36	4.57
Italy	17	2.16
Korea	57	7.23
Netherlands	111	14.09
Norway	27	3.43
Philippines	2	0.25
Russia	16	2.03
Sweden	7	0.89
Total	**788**	**100.00**

	Number	Percentage
Panel C: Maturity Length		
High (>10 years)	299	37.94
Medium	388	49.24
Low (<5 Years)	101	12.82
Total	**788**	**100.00**
Panel D: Rating		
AAA	21	2.66
AA	138	17.51
A	171	21.70
BBB	152	19.29
BB	86	10.91
B	79	10.03
CCC	11	1.40
NR	130	16.50
Total	**788**	**100.00**
Panel E: Descriptive Statistics		
Rule 144a Bonds	480	60.91
Callable	513	65.10
Sinking Fund	1	0.17
Senior	771	97.84

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 buying pressure 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 Poors sovereign long-term credit ratings.

Panel A: By Year

	Number	Mean	Median	Std. Dev.
2003	3	462.1667	473.5000	77.1271
2004	5	399.4000	492.0000	268.8751
2005	5	240.8000	116.0000	239.1081
2006	20	160.8545	131.0000	93.7449
2007	14	190.5000	192.0000	72.4439
2008	28	374.6964	325.0000	127.6515
2009	101	384.2267	300.0000	290.6485
2010	95	375.5576	235.0000	325.6482
2011	112	287.0322	215.0000	216.7502
2012	151	291.7541	185.8040	265.6236
2013	127	253.3861	151.8980	214.9437
2014	127	212.7316	146.8020	167.6280
Panel B: By Country				
Austria	6	644.2487	643.5000	263.3431
China	86	395.9978	185.4020	349.4057
Germany	24	372.6014	394.7500	289.2915
Spain	22	205.6625	159.0000	159.9845
France	104	216.5196	180.0000	166.1384
United Kingdom	249	259.2992	180.0000	231.8425
Greece	5	624.0000	630.5000	108.3492
Indonesia	19	576.9517	449.6000	306.0173
Ireland	36	370.3386	376.5000	267.1192
Italy	17	236.1654	187.5000	199.6865
Korea	57	247.7887	195.0000	159.4631
Netherlands	111	288.2416	250.0000	200.1881
Norway	27	165.0801	95.0000	216.6155
Philippines	2	406.9970	406.9970	7.7739
Russia	16	430.8125	443.1000	84.9722
Sweden	7	380.4299	344.7560	311.9684

Table 2 (continued)

	Number	Mean	Median	Std. Dev.
Panel C: By Sovereign CCR				
4 or less	12	395.8153	406.9970	130.9532
5	4	748.0250	808.0000	231.4875
6	5	741.0400	907.0000	374.3062
7	6	590.1503	607.8000	253.5772
8	19	498.0632	435.0000	225.7514
8.5	2	409.0000	409.0000	466.6908
9	5	383.6000	441.5000	144.8574
10	12	403.8095	455.0000	153.2660
11	56	258.2548	203.0000	158.7775
12	37	443.4532	200.0000	419.1592
13	88	308.4316	166.5000	261.0421
14	42	196.3123	117.5000	191.0412
15	170	260.3682	210.0000	197.5525
15.5	4	233.7500	235.0000	18.8746
16	326	267.9748	187.5000	238.3764
Panel D: By Sovereign Bid-Ask Spread Quintile				
First	180	219.2425	145.9010	190.0440
Second	215	300.2765	224.1750	245.3960
Third	81	275.8068	245.0000	191.6218
Fourth	155	273.0138	198.0000	227.8955
Fifth	157	395.9670	305.0000	311.1354
Panel E: By Institutional Buying Activities Quintile				
First	158	386.9810	319.5000	267.3526
Second	158	310.8449	225.0000	261.1167
Third	157	266.5243	195.0000	237.8157
Fourth	160	230.2356	161.2500	206.2063
Fifth	155	270.3799	175.0000	232.9163
Panel F: By Institutional Selling Activities				
First	159	286.8482	185.0000	256.1458
Second	157	297.3369	230.0000	244.7949
Third	157	299.1480	195.0000	259.9899
Fourth	160	273.8680	195.0000	239.3969
Fifth	155	308.2033	215.0000	236.9848

Table 3: Determinants of Yield Spreads of Yankee Bonds; 3-Day Institutional Trading Pressure

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 buying and selling pressure are calculated with a three day window centered on the offering date. Institutional trading pressure is standardized by taking logs in model 1, dividing by total within window trade volume in TRACE for model 2, and dividing by the number of within window trades in TRACE for model 3. 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 Poors 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 Pressure Standardized with Logs	Institutional Pressure Standardized by TRACE Volume	Institutional Pressure Standardized by TRACE Trades
Institutional buying pressure	**-56.63**	**-355.99**	**-0.00109**
	(21.42)* **	**(145.67)** **	**(0.00042)** **
Institutional selling pressure	22.19	98.32	0.00028
	(19.20)	(153.33)	(0.00049)
Sovereign Bid-ask spread	-33.29	-35.83	-35.43
	(40.75)	(40.53)	(40.67)
Sovereign CCR	**-24.87**	**-24.14**	**-24.15**
	(10.56) **	**(10.60)** **	**(10.63)** **
Credit spread	**-74.85**	**-76.10**	**-74.16**
	(19.10)* **	**(19.35)*** **	**(19.76)*** **
Term spread	16.09	16.22	16.06
	(22.98)	(23.34)	(23.25)
Log(Offering amount)	**-82.75**	**-84.08**	**-84.02**
	(13.86)* **	**(13.95)*** **	**(13.97)*** **
Log (Maturity)	6.92	6.49	6.58
	(11.58)	(11.74)	(11.76)
Log(Exchange Rate)	0.03	0.03	0.03
	(0.07)	(0.07)	(0.07)
Callable	**61.99**	**62.26**	**61.80**
	(20.80)* **	**(20.79)*** **	**(20.76)*** **
Senior	**-127.76**	**-126.67**	**-123.51**
	(30.18)* **	**(30.39)*** **	**(30.48)*** **
Rule 144a	21.27	20.15	21.38
	(18.68)	(18.55)	(18.69)
Investment Grade	**-224.35**	**-225.69**	**-225.12**
	(20.87)* **	**(20.98)*** **	**(20.99)*** **
N	788	788	788
R^2	.5805	.5795	.5793

Table 4: Determinants of Yield Spreads of Yankee Bonds; 5-Day Institutional Trading Pressure

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 buying and selling pressure are calculated with a five day window centered on the offering date. Institutional buying and selling pressure are calculated with a three day window centered on the offering date. Institutional trading pressure is standardized by taking logs in model 1, dividing by total within window trade volume in TRACE for model 2, and dividing by the number of within window trades in TRACE for model 3. 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 Poors 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.

Variable	Institutional Pressure Standardized with Logs	Institutional Pressure Standardized by TRACE Volume	Institutional Pressure Standardized by TRACE Trades
Institutional buying pressure	**-64.21**	**-436.02**	**-0.00149**
	(24.35)* **	**(170.86)** **	**(0.00051)*** **
Institutional selling pressure	30.49	182.87	0.00056
	(21.71)	(205.42)	(0.00063)
Sovereign Bid-ask spread	-32.42	-34.66	-33.93
	(41.05)	(40.51)	(40.58)
Sovereign CCR	**-25.11**	**-24.40**	**-23.99**
	(10.54) **	**(10.55)** **	**(10.55)** **
Credit spread	**-74.79**	**-75.40**	**-72.42**
	(18.92)* **	**(19.24)*** **	**(19.60)*** **
Term spread	13.20	13.27	11.03
	(23.51)	(23.70)	(23.72)
Log(Offering amount)	**-83.66**	**-84.52**	**-84.22**
	(14.10)* **	**(14.21)*** **	**(14.21)*** **
Log (Maturity)	7.11	6.89	6.85
	(11.51)	(11.62)	(11.62)
Log(Exchange Rate)	0.03	0.03	0.03
	(0.07)	(0.07)	(0.07)
Callable	**63.27**	**62.62**	**62.25**
	(20.84)* **	**(20.82)*** **	**(20.70)*** **
Senior	**-126.30**	**-124.60**	**-121.15**
	(31.02)* **	**(30.45)*** **	**(30.75)*** **
Rule 144a	19.29	17.80	18.33
	(18.50)	(18.48)	(18.48)
Investment Grade	**-226.18**	**-227.23**	**-227.01**
	(20.81)* **	**(20.98)*** **	**(20.98)*** **
N	788	788	788
R^2	.5812	.5807	.5817

Table 5: Determinants of Yield Spreads of Yankee Bonds; Robustness of Base Case

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 buying and selling pressure are calculated with a five day window centered on the offering date. Institutional buying and selling pressure are calculated with a three day window centered on the offering date. Institutional trading pressure is standardized by taking logs in model 1, dividing by total within window trade volume in TRACE for model 2, and dividing by the number of within window trades in TRACE for model 3. 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 Poors 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	3-Day Institutional Pressure Standardized by TRACE Volume			
Institutional buying pressure	**-385.678**	**-387.50**	**-385.64**	**-380.14**
	(144.88)* **	**(144.92)*** **	**(145.19)*** **	**(144.18)*** **
Institutional selling pressure	81.60	79.15	80.97	77.41
	(151.61)	(152.30)	(152.99)	(155.68)
Sovereign Bid-ask spread	26.06	25.31	25.12	26.18
	(25.77)	(25.83)	(25.86)	(25.72)
Sovereign CCR	**-11.87**	**-11.86**	**-11.62**	**-11.80**
	(3.80)* **	**(3.81)*** **	**(3.82)*** **	**(3.77)*** **
Credit spread	**-64.17**	**-63.82**	**-63.04**	**-65.37**
	(18.88)* **	**(19.08)*** **	**(18.88)*** **	**(18.94)*** **
Term spread	12.58	11.58	11.07	12.16
	(22.97)	(23.09)	(23.18)	(23.04)
Log(Offering amount)	**-78.55**	**-78.51**	**-78.79**	**-77.67**
	(12.91)* **	**(12.91)*** **	**(12.90)*** **	**(12.71)*** **
Log (Maturity)	2.62	3.02	3.21	1.44
	(11.53)	(11.56)	(11.53)	(11.59)
Log(Exchange Rate)	0.02	0.02	0.02	0.02
	(0.05)	(0.05)	(0.05)	(0.05)
Callable	**72.86**	**71.72**	**72.59**	**76.06**
	(19.12)* **	**(19.22)*** **	**(19.45)*** **	**(19.53)*** **
Senior	**-128.70**	**-127.51**	**-127.77**	**-132.21**
	(28.58)* **	**(28.90)*** **	**(29.07)*** **	**(29.05)*** **
Rule 144a	**39.47**	**40.35**	**41.23**	**50.33**
	(16.63) **	**(16.70)** **	**(16.65)** **	**(17.81)*** **
Investment Grade	**-226.75**	**-225.69**	**-225.85**	**-221.94**
	(18.84)* **	**(18.74)*** **	**(18.75)*** **	**(18.60)*** **
Creditor Rights Index	**14.23**	**14.19**	**13.82**	**14.84**
	(4.96)* **	**(4.93)*** **	**(4.94)*** **	**(4.85)*** **
Non-Yankee Issuance Flag		-13.76	-27.25	**98.39**
		(18.80)	(22.34)	**(40.41)** **

Non-Yankee Issuance Count			2.84 (4.05)	
Non-Yankee Issuance Relative Amount				**-196.65 (67.67)*** **
N	788	788	788	788
R^2	.5535	.5538	.5541	.5572

Table 6: Determinants of Yield Spreads of Yankee Bonds by Bond Credit Risk

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, are calculated with a three-day window centered on the offering date, and standardized by dividing by the total volume of within window trades in TRACE. 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 Poors sovereign long-term credit ratings. 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	Investment Grade	High-yield Bonds
Institutional buying pressure	-161.63	**-913.63**
	(116.27)	**(285.81)*** **
Institutional selling pressure	2.63	**402.82**
	(43.62)	**(239.82)***
Sovereign Bid-ask spread	8.28	9.26
	(11.95)	(52.03)
Sovereign CCR	**-17.15**	-7.30
	(3.93)* **	(5.85)
Credit spread	**-61.79**	16.41
	(15.27)* **	(79.94)
Term spread	13.67	-52.13
	(17.09)	(60.31)
Log(Offering amount)	-8.19	**-113.62**
	(13.41)	**(24.59)*** **
Log (Maturity)	**36.38**	-50.34
	(6.22)* **	(45.72)
Log(Exchange Rate)	**0.16**	0.03
	(0.063) **	(0.05)
Callable	-0.91	**157.41**
	(16.54)	**(39.94)*** **
Senior	**-87.46**	**-293.56**
	(30.11)* **	**(74.37)*** **
Rule 144a	17.93	**161.35**
	(14.94)	**(41.43)*** **
Creditor Rights Index	**10.41**	11.06
	(4.43) **	(13.03)
Non-Yankee Issuance Flag	-26.25	191.74
	(49.60)	(138.29)
Non-Yankee Issuance Relative Amount	13.69	-378.21
	(72.96)	(217.08)
N	482	306
R^2	.5104	.4431

Table 7: Determinants of Yield Spreads of Yankee Bonds by 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, are calculated with a three-day window centered on the offering date, and standardized by dividing by the total volume of within window trades in TRACE. All bonds in the top quintile of sovereign liquidity have senior status. 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 Poors 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	Bottom Quintile	Top Quintile
Institutional buying pressure	-351.60	**-443.03**
	(378.14)	**(234.57)***
Institutional selling pressure	**650.95**	**714.00**
	(216.79)***	**(258.16)*****
Sovereign Bid-ask spread	-13.21	1258.48
	(32.82)	(3861.94)
Sovereign CCR	-4.51	4.99
	(9.70)	(22.11)
Credit spread	-99.76	46.88
	(75.23)	(105.18)
Term spread	90.42	-58.31
	(70.49)	(60.05)
Log(Offering amount)	**-98.76**	**-58.93**
	(31.50)***	**(28.91)****
Log (Maturity)	**-115.85**	**54.64**
	(39.21)***	**(17.70)*****
Log(Exchange Rate)	0.01	300.22
	(0.05)	(334.22)
Callable	**145.69**	-24.92
	(48.29)***	(33.46)
Senior	N/a	-54.04
		(38.61)
Rule 144a	**95.05**	**91.97**
	(50.04)*	**(28.37)*****
Investment Grade	**-222.42**	**-170.35**
	(53.56)***	**(32.74)*****
Djankov Index	37.47	1.40
	(66.92)	(16.89)
Non-Yankee Issuance Flag	**388.52**	**173.00**
	(221.61)*	**(103.39)***
Non-Yankee Issuance Relative Amount	**-521.56**	**-333.02**
	(278.22)*	**(124.06)*****
N	157	180
R^2	.7142	.6120

Table 8: 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, are calculated with a three-day window centered on the offering date, and standardized by dividing by the total volume of within window trades in TRACE. All bonds in the top quintile of sovereign liquidity have senior status. 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 Poors 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
Institutional buying pressure	**-380.62**	**-419.02**
	(111.78)* **	**(209.36)** **
Institutional selling pressure	49.88	13.65
	(111.51)	(186.33)
Sovereign Bid-ask spread	8.90	18.26
	(11.75)	(45.10)
Sovereign CCR	**-16.78**	**-9.91**
	(4.21)* **	**(5.46)** *
Credit spread	-32.52	**-72.44**
	(21.64)	**(25.60)*** **
Term spread	-13.07	16.75
	(22.70)	(35.57)
Log(Offering amount)	**-34.19**	**-130.88**
	(14.45) **	**(18.73)*** **
Log (Maturity)	**26.16**	-9.10
	(7.47)* **	(23.36)
Log(Exchange Rate)	0.10	0.02
	(0.12)	(0.04)
Callable	-29.37	**101.10**
	(28.55)	**(23.89)*** **
Senior	**-93.99**	**-171.85**
	(49.66) *	**(43.80)*** **
Investment Grade	**-150.58**	**-214.00**
	(39.76)* **	**(21.87)*** **
Djankov Index	**10.66**	9.68
	(5.13) **	(7.20)
Non-Yankee Issuance Flag	-57.47	**213.49**
	(55.64)	**(90.38)** **
Non-Yankee Issuance Relative Amount	12.39	**-360.37**
	(78.12)	**(130.92)*** **
N	308	480
R^2	.5404	.5416

Table 9: Determinants of Yield Spreads on Yankee Bonds; Time Series Analysis

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. 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. 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 Poors sovereign long-term credit ratings. Results are 90% winsorized. Standard errors are clustered at the individual bond level. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	All Bonds	Investment Grade	High Yield
Institutional buying pressure	-10.50	**-18.19**	24.17
	(6.64)	**(6.25)*** **	(23.35)
Institutional selling pressure	**15.49**	**18.52**	0.06
	(2.63)* **	**(2.66)*** **	(9.54)
Sovereign Bid-ask spread	**53.85**	**66.74**	**50.56**
	(11.25)* **	**(12.56)*** **	**(24.13)** **
Sovereign CCR	**-10.14**	**-10.53**	-0.03
	(2.03)* **	**(2.03)*** **	(6.98)
Credit spread	**-71.39**	**-57.22**	**-101.79**
	(4.38)* **	**(4.15)*** **	**(11.07)*** **
Term spread	**61.34**	**59.57**	**37.07**
	(3.83)* **	**(3.65)*** **	**(11.85)*** **
Log (Offering amount)	-7.06	-0.79	**-46.34**
	(5.84)	(6.18)	**(16.65)*** **
Log (Maturity)	**112.51**	**113.09**	**36.14**
	(3.02)* **	**(3.10)*** **	**(18.28)** **
Log (Exchange Rate)	**26.53**	**23.57**	**33.04**
	(3.17)* **	**(3.01)*** **	**(10.10)*** **
Callable	**-48.88**	**-52.25**	-28.99
	(8.39)* **	**(8.80)*** **	(30.85)
Senior	**-52.71**	**-67.75**	-29.27
	(15.26)* **	**(11.35)*** **	(36.45)
Rule 144A	**11.33**	9.89	38.55
	(6.17)*	(6.14)	(31.39)
N	10756	9205	1551
R^2	.7832	.7421	.5447

Table 10: Determinants of Yield Spreads on Yankee Bonds; Time Series Analysis by Sovereign 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. 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. 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 Poors sovereign long-term credit ratings. Results are 90% winsorized. Standard errors are clustered at the individual bond level. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Top Quintile	Bottom Quintile
Institutional buying pressure	-1.49	**-48.95**
	(15.65)	**(17.69)*** **
Institutional selling pressure	5.88	**28.52**
	(14.62)	**(5.37)*** **
Sovereign Bid-ask spread	**-4775.11**	**45.14**
	(1079.60)* **	**(13.19)*** **
Sovereign CCR	11.12	-4.61
	(8.13)	(3.29)
Credit spread	**-94.66**	**-77.99**
	(25.11)* **	**(11.62)*** **
Term spread	52.80	**52.17**
	(13.22)	**(9.38)*** **
Log (Offering amount)	-9.79	-15.18
	(9.54)	(9.24)
Log (Maturity)	**113.96**	**96.65**
	(5.94)* **	**(5.55)*** **
Log (Exchange Rate)	**11.77**	**27.03**
	(7.12)*	**(6.25)*** **
Callable	**-35.35**	-3.55
	(13.51)* **	(15.93)
Senior	**-42.96**	**-181.89**
	(22.29)*	**(66.37)*** **
Rule 144A	**17.81**	**22.41**
	(8.59) **	**(11.16)** **
N	2136	2183
R^2	.8188	.7879

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. 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. 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 Poors sovereign long-term credit ratings. Results are 90% winsorized. Standard errors are clustered at the individual bond level. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Public Bonds	Private Bonds
Institutional buying pressure	-10.29	-4.93
	(7.61)	(11.19)
Institutional selling pressure	**19.19**	**10.02**
	(3.13)* **	**(4.39)** **
Sovereign Bid-ask spread	**86.95**	**35.91**
	(29.23)* **	**(11.14)*** **
Sovereign CCR	**-5.69**	**-14.53**
	(2.60) **	**(3.38)*** **
Credit spread	**-66.11**	**-76.17**
	(5.96)* **	**(7.31)*** **
Term spread	**63.90**	**59.59**
	(4.78)* **	**(5.99)*** **
Log (Offering amount)	10.03	**-29.16**
	(8.42)	**(7.64)*** **
Log (Maturity)	**116.99**	**99.02**
	(4.32)* **	**(4.67)*** **
Log (Exchange Rate)	**18.20**	**35.65**
	(3.79)* **	**(5.08)*** **
Callable	**-58.51**	**-32.34**
	(14.02)* **	**(11.74)*** **
Senior	4.16	**-86.54**
	(26.02)	**(20.26)*** **
N	6132	4624
R^2	.7584	.7784