Can Equity Volatility Explain the Global Loan Pricing Puzzle?*

Lewis Gaul† Pinar Uysal‡

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ABSTRACT

We examine whether equity volatility can explain the difference in syndicated corporate loan spreads paid by U.S. and European borrowers. We argue that because equity volatility is an error prone measure of firm volatility, controlling for equity volatility in OLS regressions will result in biased and inconsistent estimates of the difference in U.S. and European loan spreads. Therefore, we use instrumental variables methods to identify consistent estimates of the difference in U.S. and European loan spreads. In our instrumental variable results, we find no statistically significant difference in U.S. and European loan spreads.

JEL codes: E40, G12, G15, G21

A large literature analyzes the determinants of syndicated loan pricing. However, recent research by Carey and Nini (2007) suggests that there are still important gaps in economists' understanding of this market. They provide evidence that corporate loan interest rate spreads in the European syndicated loan market are 30 basis points lower than in the United

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†Financial Economist, Policy Analysis Division, Office of the Comptroller of the Currency, 250 E St. SW, 3rd Floor, Washington, DC 20219, e-mail: Lewis.Gaul@occ.treas.gov

‡Post-doctoral Fellow, École Polytechnique Fédérale de Lausanne (EPFL), Chair of International Finance, Station 5, Office ODY 2.17, CH - 1015 Lausanne, Switzerland, e-mail: pinar.uysal@epfl.ch

States market, and that U.S. borrowers rarely borrow in the apparently lower cost European loan market. This is puzzling because Becker and Ivashina (2011) show that the syndicated corporate loan market is a primary source of debt financing for large publicly traded corporations. One would expect that large internationally active corporations located in the United States would access European markets to minimize their financing costs and eliminate the observed loan price discrepancy. The results from Carey and Nini (2007) suggest that there must either be some unknown barrier that prohibits U.S. borrowers from accessing the lower cost European syndicated loan market, or an unidentified determinant of the corporate loan spreads that can explain this pricing differential.

In this paper, we hypothesize that volatility differences between U.S. and European firms could be responsible for the estimated difference in U.S. and European loan spreads. To explore our hypothesis, we analyze whether equity volatility, an error prone measure of firm volatility, can explain the difference in syndicated corporate loan spreads paid by U.S. and European borrowers.

Why do we expect equity volatility could explain the U.S. and European loan pricing difference? First, it is well established in the finance and economics literature that firm volatility is an important determinant of the cost of corporate debt financing and that equity volatility is a measure of firm volatility in financial markets. Beginning with Merton (1974), contingent claims models of corporate debt valuation predict that credit risk and the cost of debt financing is a function of firm volatility, which these studies generally refer to as firms' asset value volatility. This literature models the value of risky corporate debt as the value of a risk free bond minus compensation for expected losses, where compensation for expected loses is valued as a put option written to shareholders on the value of firms' assets with a strike price equal to the face value of debt. In these models, an increase in firms' asset volatility raises the cost of debt by increasing the value of the put option. These models also predict that equity volatility is a direct function of firm's asset volatility, which typically motivates the use of equity volatility as a measure of firm volatility in financial markets.

Empirical studies support the predictions of these models. Campbell and Taksler (2003) present evidence that equity volatility explains substantial variation in corporate bond yields, and Santos (2011) and Santos and Winton (2010) find that equity volatility has a significant association with syndicated corporate loan spreads. Multiple studies use equity volatility as a measure of firm volatility in default prediction models (i.e. Campbell, Hilscher, and Szilagyi (2008), Shumway (2001)). And, credit risk measures based on contingent claims models of debt valuation, commonly use estimates of equity volatility as inputs to measure firm volatility (i.e. Crosbie and Bohn (2001), Campbell et al. (2008), Lando (2004)).

While we expect equity volatility to have significant explanatory power for the cost of corporate loan financing, we expect that equity volatility may explain the *difference* in U.S. and European loan spreads because recent research by Bartram, Brown, and Stulz (2009) indicates that U.S. firms' equity volatility is greater than the equity volatility of similar foreign firms, and that the difference in equity volatility between U.S. and European firms reflects that U.S. firms are riskier or more volatile than similar European firms. They also show that firms' equity volatility is higher in countries with greater legal protection of shareholders' rights, stock market development, and innovation. Consistent with this motivation, we also examine whether there are similar differences in these country specific factors between the U.S. and the set of European countries in our data sample, and whether these factors are associated with equity volatility and loan pricing.

In Figure (1), we plot average loan spreads along with estimates of borrowers' average

Figure 1: Spread and Volatilities in the US and Europe

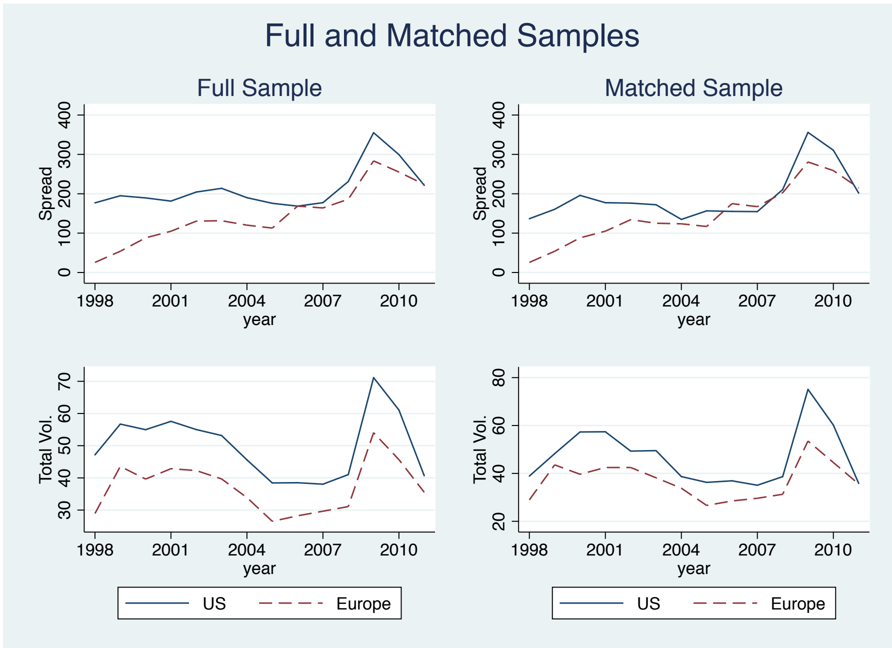
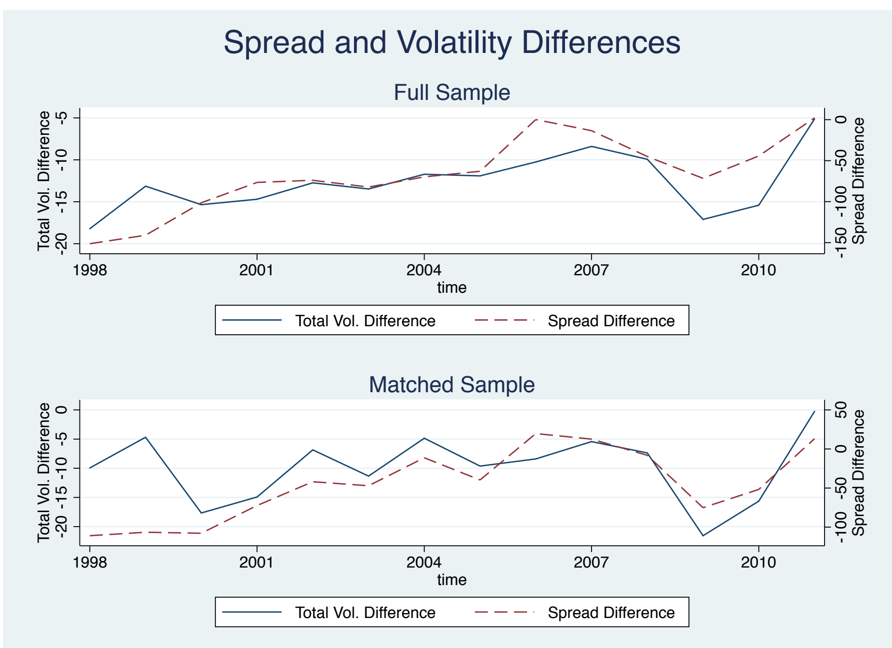


Figure 2: Differences in Spread and Volatilities



equity volatility for loans made to borrowers located in either the U.S. or Europe. We include plots from two data samples. The first data sample includes information on the full sample of all available loans in our data sample, and the second sample includes a subset of the first data set and only includes loans made to a propensity score matched sample of observably similar U.S. and European borrowers. Figure (1) shows that U.S. firms have greater average equity volatility as compared to European firms for most of the data sample and that the volatility gap has narrowed over time. In addition, average equity volatility appears to follow a similar cyclical pattern for both U.S. and European firms. In Figure (2) we plot the average difference in equity volatility and the average difference in loan spread between the US and European borrowers for both the full and matched data samples. This figure shows that the average difference in equity volatility is closely related to the average difference in U.S. and European loan spreads.

We use a large sample of corporate loans from the Dealscan database to examine whether equity volatility can explain the difference in U.S. and European loan spreads. Previous research that examines the effect of equity volatility on corporate bond or loan yields typically includes estimates of equity volatility in OLS regressions as a measure of firm volatility. However, we show that if equity volatility is an error prone measure of firm volatility, then including equity volatility in OLS regressions will result in biased and inconsistent estimates of the difference in U.S. and European loan spreads. This result holds even if equity volatility controls for the effect that firm volatility has on loan spreads. The reason is that the error in measuring firm volatility with equity volatility will produce biased and inconsistent coefficient estimates for any regressor correlated with firm volatility. We use estimates of the volatility of financial statement ratios as instruments for equity volatility and instrumental variable (IV) methods to solve the measurement error problem and obtain consistent estimates of the difference in U.S. and European corporate loan spreads.

In addition, because we expect that country specific factors are responsible for difference in equity volatility between the U.S. and Europe, we focus our analysis on the difference in volatility and loan spreads between loans originated by borrowers located in the U.S. and in European countries. However, given that the analysis of Carey and Nini (2007) provides the initial motivation for our analysis, we also show whether equity volatility explains the difference in loan spreads between the U.S. and European syndicated loan markets. Nevertheless, ex-ante, we do not expect our results to depend on whether we focus on market of syndication or borrower location because borrowers overwhelmingly originate loans in their home region. Table I, which tabulates borrowers' country of location against their loans' market of syndication provides support for this claim. The tabulations indicate that with few exceptions borrowers originate loans in their home market in the Dealscan database. Also, as previously mentioned, the analysis of Carey and Nini (2007) similarly shows that U.S. and European firms rarely borrow in foreign markets.

[PLACE TABLE I HERE]

In OLS estimates that control for equity volatility, we find that loan spreads received by European borrowers are roughly 50 basis points lower than those received by U.S. borrowers, and that loan spreads are roughly 57 basis points lower in the European syndicated loan market than in the U.S. syndicated loan market. In contrast, our main IV results indicate that there is no statistically significant difference in loan spreads received by European and U.S. borrowers, and no statistically significant difference in loan spreads between U.S. and European syndicated loan markets. In addition, we find that country-level measures of the protection of shareholder rights, stock market development, and innovative activity are greater in the U.S. than in the European countries in our data sample, and that these factors have a significant association with with both equity volatility and loan spreads. Taken together, our results indicate that there are structural differences between the U.S. and Europe responsible for differences in the volatility and borrowing costs between U.S. and European firms.

Our results indicate that there is no material loan pricing difference between loans received by U.S. and European borrowers. This result suggests that on average, U.S. borrowers do not stand to gain by obtaining a loan in Europe and vice versa, and that borrowers could potentially be indifferent between borrowing in either U.S. or European syndicated loan markets. If borrowers are indifferent to borrowing in either market, it may seem puzzling that we do not observe firms crossing markets markets more often. However, the analysis of Sufi (2007) suggests one reason why borrowers may not cross markets. Sufi shows that firms tend to borrow from lenders that are located geographically more closely to mitigate asymmetric information problems, and that borrower reputation mitigates, but does not eliminate asymmetric information problems. This reasoning suggests that firms would potentially be forced to pay loan spreads above the prevailing equilibrium rates we observe in our data set if they borrowed in distant foreign markets. In relation to our results, we suggest that the results from Sufi (2007) can be interpreted as support for the claim that borrowers may tend to borrow in their home market to mitigate asymmetric information problems with lenders, and obtain more favorable loan financing terms than they would receive if they borrowed outside their home market, and that this may even be the case for the largest, most reputable borrowers. Hence, we claim that equal borrowing costs in U.S. and European syndicated corporate loan markets are not inconsistent with the with the observed home bias in U.S. and European loan markets.

A limitation of the data set we use in our analysis is that the Dealscan database contains observations on a large number of loans to U.S. borrowers relative to European borrowers. Our full data set contains information on roughly 16,000-17,000 loan facilities, where roughly 15,000 of these observations are for loans originated by U.S. borrowers. Our results indicate that Dealscan's coverage of the European market typically consists of firms that are generally larger and less risky than the average firm in the Dealscan universe, while the U.S. sample contains information on borrowers that span a much broader risk spectrum. Therefore, to ensure that differences in the composition of the U.S. and European subsamples are not driving our results, we produce the majority of our results using a smaller propensity score matched sample of observably similar U.S. and European borrowers. However, for comparison, we present our main results using both the full data sample and the smaller matched sample, and these results indicate that differences in the composition of our U.S. and European samples do not drive our main results.

A potential criticism of our results is that differences in equity volatility between the U.S. and Europe could be driven by factors other than firm volatility and risk. We show that this would potentially bias our analysis toward finding evidence of no loan pricing difference between U.S. and European firms' loans even if a difference exists. For example, differences in U.S. and European firms' equity volatility could be driven by differences in stock market liquidity rather than firm volatility or risk. To mitigate these concerns, we present several robustness and consistency checks on our analysis, and none of these checks indicate that factors other than firm volatility and risk relevant to lenders' loan pricing decision are responsible for differences in U.S. and European firms' equity volatility in our data sample.

We also provide several other sets of robustness checks. In our primary robustness checks, we show that our results are robust to controlling for other credit risk measures that contain information on stock return volatility. Among other robustness checks, we also present evidence that our main results do not depend on variations in loan contract terms that vary across countries and markets such as loan currencies (e.g. Dollar, Euro, Pound), base rates (e.g. LIBOR, Euribor), and non-price loan contract terms (e.g. loan maturity, number of lenders, performance pricing, covenants and whether a loan is secured with collateral).

The remainder of the paper is as follows. Section I presents the econometric procedure. Section II describes the data and the creation of the proxy variables. Section III shows the estimation results and robustness checks. Section IV concludes.

I. Empirical Model

In this section we present the empirical model that we use to examine the determinants of loan spreads for U.S. and European borrowers. We base our model on the literatures that analyze syndicated loan pricing and contingent claims models of corporate debt valuation. We motivate our model as a linear approximation to a conditional expectation function for syndicated corporate loan interest rate spreads, or a linear approximation to the data generating process for loan spreads. Our model is given by the following equation:

$$r_i - r_f = \beta_0 + \beta_1 \sigma_{Ai} + \beta_2 \frac{D_i}{A_i} + \beta_3 E_i + \beta_4 Z_{4i} + \ldots + \beta_k Z_{ki} + \varepsilon_{1i} \qquad (1)$$

In equation (1), the subscript i refers to firm i, and $r_i - r_f$, is the interest rate spread on a loan, defined as the interest rate on the loan or total borrowing rate, r_i, minus the risk free rate, r_f. The risk spread is explained by, E, a dummy variable indicating whether the firm is located in Europe, the volatility of the firm's assets (firm volatility), σ_A, borrower leverage,

$\frac{D}{A}$, which is total debt, D, divided by the market value of assets, A, and several other control variables, $Z_4 - Z_k$, which include additional risk factors. We refer to firm volatility as firm's asset volatility, σ_A, which is the measure of firm volatility that is relevant to contingent claims models of debt valuation. However, we suggest that σ_A is intended to capture a more general sense of uncertainty about borrowers' ability to repay their obligations in the future. For example, we do not suggest that lenders always assess, estimate, or attempt to measure firms' asset volatility. Instead, we suggest that σ_A could also represent lenders' subjective assessment of uncertainty about the value of the firms' assets or firms' ability to repay their obligations. Therefore, we generally refer to σ_A as the information about firm volatility or uncertainty about firms' ability to meet their debt obligations that is ultimately priced in syndicated corporate loan interest rates.

We assume the right hand side explanatory variables reflect information available to lenders prior to loan origination, and as a result, we date all explanatory variables in the calendar year prior to loan origination. However, the values of σ_A and $\frac{D}{A}$ relevant to lenders loan pricing decisions are expectations of future values between the loan origination date and the final loan repayment date. Therefore, we assume that lenders would use lagged information to make forecasts of future variables because lenders can only base their forecasts of variables such as σ_A and $\frac{D}{A}$ on information available prior to origination. For example, in empirical implementations of option theoretic credit risk models, analysts form forecasts of future equity volatility, leverage, firm volatility, and firms asset values based on information available on leverage, equity values, and equity volatility available at the time of the forecast, which for lenders would be information prior to loan origination.

We assume that error term and ε_1 is normally distributed residual with mean zero and variance $\sigma^2_{\varepsilon 1}$, i.e. $\varepsilon_1 \sim N[0, \sigma^2_{\varepsilon 1}]$. We also assume that ε_1 is orthogonal to all explanatory variables in equation (1).

Our primary objective with this model is to obtain a consistent estimate of β_3, which measures the difference in loan spreads paid by U.S. and European borrowers. To obtain a consistent estimate of β_3, we need observable counterparts for each right hand side explanatory variable that is correlated with the European dummy variable and the other remaining observable control variables. However, firm volatility is unobservable. If we cannot observe an firm volatility, we could allow firm volatility to be absorbed into the regression error term. However, our main hypothesis is based on the assertion that firm volatility depends on whether a firm is located in the U.S or Europe. Therefore, if we cannot somehow control for firm volatility, then we expect to obtain biased and inconsistent estimates of β_3. In addition, we would also obtain biased and inconsistent coefficient estimates for all variables that are correlated with firm volatility. If we estimate equation (1) with OLS and omit σ_A as a regressor and allow σ_A to be absorbed into the regression error term, the probability limit for the estimate of β_3, which we denote as $\widehat{\beta_3^{OVB}}$, *(OVB: omitted variable bias)*, is equal to

$$\text{plim}\widehat{\beta_3^{OVB}} = \beta_3 + \beta_1 \phi_{\sigma_A, E_i} \tag{2}$$

Equation (2) states that the the bias in the estimate of β_3 is equal to the value of the coefficient for firm volatility multiplied by a term which equals the coefficient on the European dummy variable in a regression of firm volatility on all of the remaining control variables in equation (1). We denote this estimate as $\widehat{\beta_3^{OVB}}$ for the remainder of the paper. Equation (2) shows that the coefficient estimate of $\widehat{\beta_3^{OVB}}$ is downward biased, if ϕ_{σ_A, E_i} is negative as we expect.

Therefore, to have any hope of obtaining a consistent estimate of β_3, we must remove the effect that unobserved firm volatility has on this coefficient estimate. Our solution is to remove firm volatility from our estimation equation by replacing firm volatility with equity volatility. We begin describing this approach by postulating the following linear relationship between leverage, equity volatility, and firm volatility:

$$\sigma_{Ei} = \alpha_0 + \alpha_1 \sigma_{Ai} + \alpha_2 \frac{D_i}{A_i} + \varepsilon_{2i} \tag{3}$$

In equation (3), we assume that the error term ε_2 is normally distributed with mean zero and variance $\sigma^2_{\varepsilon 2}$, i.e. $\varepsilon_2 \sim N[0, \sigma^2_{\varepsilon_2}]$. We include leverage in equation (3) because greater leverage is thought to be associated with greater stock return volatility in contingent claims models of debt and equity valuation.

Our main description of the error term, ε_2, is that ε_2 contains information on other determinants of equity volatility that are unrelated to firm volatility and leverage. Hence, we assume that ε_2 is correlated with equity volatility and orthogonal to asset volatility and leverage. For example, one description of the error consistent with previous research is that the error term reflects liquidity determinants of equity volatility. For example, Bartram et al. (2009) show that greater incidence of zero returns, which Lesmond, Ogden, and Trzcinka (1999) relate to greater transaction costs and bid ask spreads, is associated with lower equity volatility.

The error term, ε_2, could also reflect standard classical measurement error. For example, equation (3) states that equity volatility is related to firm volatility and leverage. However, we do not observe the true value of equity volatility. Therefore, this measurement error would also be absorbed into ε_2.

To derive an estimation equation where equity volatility stands in for firm volatility, we solve for firm volatility in equation (3) as:

$$\sigma_{Ai} = \frac{\sigma_{Ei}}{\alpha_1} - \frac{\alpha_0}{\alpha_1} - \frac{\alpha_2}{\alpha_1}\frac{D_i}{A_i} - \frac{\varepsilon_{2i}}{\alpha_1} \tag{4}$$

and insert this expression into equation (1). This gives us the following regression model:

$$\begin{aligned} r_i - r_f &= \left(\beta_0 - \frac{\beta_1\alpha_0}{\alpha_1}\right) + \frac{\beta_1}{\alpha_1}\sigma_{Ei} + \left(\beta_2 - \frac{\beta_1\alpha_2}{\alpha_1}\right)\frac{D_i}{A_i} + \beta_3 E_i + \beta_4 Z_{4i} + \ldots + \beta_k Z_{ki} \\ &\quad + \left(\varepsilon_{1i} - \frac{\beta_1}{\alpha_1}\varepsilon_{2i}\right) \qquad (5) \\ r_i - r_f &= \rho_0 + \rho_1\sigma_{Ei} + \rho_2\frac{D_i}{A_i} + \beta_3 E_i + \beta_4 Z_{4i} + \ldots + \beta_k Z_{ki} + \eta_i \qquad (6) \end{aligned}$$

We assume that the error term ε_2 is orthogonal to all of the explanatory variables in equation (6). In contrast to equation (1), equation (6) models interest rate spreads as a function of equity volatility rather than asset volatility. We note that this model is unable to identify the parameters β_0, β_1, and β_2. However, given that we do not assume that the European dummy variable or the remaining control variables Z_4-Z_k appear in (3), we assume our model can identify β_3 through β_k.

We will estimate equation (6) by regressing a measure of loan spreads on observable counterparts to a set of several control variables. However, if we estimate the coefficients in equation (6) with OLS, then we expect that our coefficient estimates will still be biased and inconsistent even though we have have removed firm volatility from the model. This is because we expect that equity volatility is correlated with the error term, η_i. This is because

$$COV\left(\sigma_{Ei},\varepsilon_{2i}\right)=VAR\left(\varepsilon_{2i}\right)=\sigma_{\varepsilon_2}^2\neq 0\;\Rightarrow\;COV\left(\sigma_{Ei},\eta_i\right)=-\rho_1\sigma_{\varepsilon_2}^2. \tag{7}$$

This relationship between equity volatility and the error term should result in a downward biased estimate of ρ_1. Yet, more importantly for our purposes, the error in measuring firm volatility will lead to biased and inconsistent coefficient estimates for all control variables correlated with firm volatility, which includes β_3, our estimates of the difference in U.S. and European loan spreads.

To examine the bias in the coefficients we define: $\text{plim}\frac{X^{*\prime}X^*}{n}=Q^*$ where X^* is as matrix of explanatory variables that includes all control variables in equations (1) and (6) including the unobserved variable σ_A. We use the inverse of this matrix to define q^{*j1} as the $(j,1)$th element in Q^{*-1}.

With this notation, the probability limit of the coefficient estimate for equity volatility can be expressed as:[1]

$$\text{plim}\hat{\rho}_1=\text{plim}\frac{\widehat{\beta_1}}{\alpha_1}=\frac{\beta_1}{\alpha_1}\pi_1 \tag{8}$$

where

$$\pi_1=\frac{\alpha_1^2\left(q^{*11}\right)^{-1}}{\alpha_1^2\left(q^{*11}\right)^{-1}+\sigma_{\varepsilon_2}^2} \tag{9}$$

In equation (8), the probability limit for, $\frac{\widehat{\beta_1}}{\alpha_1}$, is equal to the true value of the coefficient multiplied by a term, π_1, which represents the signal to noise ratio for equity volatility after

[1]Please see Appendix A for the derivations of all subsequent probability limits.

removing all information in equity volatility that is correlated with the other regressors in equation (6). Equation (9) shows the signal to noise ratio for equity volatility. In equation (9), the term $(q^{*11})^{-1}$ represents the variance of the residuals from a regression of σ_A onto the remaining explanatory variables in equation (1), and $\sigma^2_{\varepsilon_2}$ represents the variance of ε_2. We also note that denominator in equation (9) represents the variance of the residuals from a regression of equity volatility onto the remaining the control variables in equation (6). Equation (8) shows that there will be a downward bias in the coefficient estimate ρ_1 because the signal to noise ratio for equity volatility is less than one if $\sigma^2_{\varepsilon_2}$ is greater than zero. In addition, equation (8) shows that the downward bias is increasing in $\sigma^2_{\varepsilon_2}$.

Next, we examine the probability limit for β_3. This probability limit is given by

$$\text{plim}\hat{\beta}_3 \quad = \quad \beta_3 + \beta_1 \, \phi_{\sigma_A, E_i} \, (1 - \pi_1) \tag{10}$$

This probability limit is identical to the probability limit for, $\widehat{\beta_3^{OVB}}$, with the exception that the second term is multiplied by one minus the signal to noise ratio. Compared to the probability limit for, $\widehat{\beta_3^{OVB}}$, this probability limit can be interpreted as indicating that controlling for equity volatility reduces the bias due to not observing or directly controlling for firm volatility in OLS regressions. But, the reduction in the bias is determined by the fraction of the variability in equity volatility that represents error in measuring firm volatility. Therefore, controlling for firm volatility with equity volatility in OLS regressions will still result in biased and inconsistent estimates of the difference in U.S. and European loan spreads. Similar to the probability limit in equation (2), the probability limit in equation (10) shows that the coefficient estimate of β_3 is downward biased, if ϕ_{σ_A, E_i} is negative. The equation also shows that the bias would disappear if $\sigma^2_{\varepsilon_2}$ was equal to zero.

The probability limits for the coefficients that multiply the remaining control variables other than leverage, which include $Z_4 - Z_k$ are given by

$$\text{plim}\hat{\beta}_j \;\; = \;\; \beta_j + \beta_1\, \phi_{\sigma_A, Z_j}\, (1-\pi_1) \qquad \text{for} j = 4, 5 \ldots, k\;, \tag{11}$$

In equation (11), ϕ_{σ_A, Z_j} is the coefficient on Z_j in a regression of σ_A on all other control variables included in equation (1). This probability limit states that $\hat{\beta}_j$ is equal to the true value of the coefficient plus a term that is, β_1, the coefficient that multiplies firm volatility in equation (1), multiplied by ϕ_{σ_A, Z_j} and one minus the signal to noise ratio. The interpretation of these probability limits is identical to the interpretation of the probability limit for $\hat{\beta}_3$

The final probability limit is for the coefficient multiplying leverage, ρ_2, which would be similar for any variable that would be included in the equation for both equity volatility and loan spreads. The probability limit is

$$\text{plim}\hat{\rho}_2 = \text{plim}\widehat{\beta_2 - \beta_1}\frac{\alpha_2}{\alpha_1} = \left(\beta_2 - \beta_1 \frac{\alpha_2}{\alpha_1}\right) + \beta_1 \left[\phi_{\sigma_A, x_2} + \frac{\alpha_2}{\alpha_1}\right](1-\pi_1) \tag{12}$$

The probability limit for the coefficient multiplying leverage in equation (5) is similar to the other control variables as shown in equation (11). The extra term in equation (12) is the $\beta_1 \frac{\alpha_2}{\alpha_1}$, which measures the linear effect that leverage would have on loan spreads through the effect that leverage has on equity volatility, multiplied by the noise to signal ratio for equity volatility. Again, the probability limit for leverage shows that the total bias in estimating the coefficient multiplying leverage would disappear if $\sigma^2_{\varepsilon_{2i}}$ is equal to zero.

We attempt to obtain consistent estimates of β_3 and the remaining regression coefficients with instrumental variable methods. We use estimates of the volatility of quarterly financial statement ratios as instrumental variables for equity volatility. Our instruments include the standard deviation of the ratio of total equity to total assets, and the standard deviation of cash and short term investments to assets. Our reasoning is simple. We suggest that estimates of financial statement volatility are determinants of firms' asset volatility.[2] We expect that if there is greater variation in these borrowers' quarterly financial statements, then investors' valuation of firms' assets should change more frequently. Hence, firms with more volatile financial statements should have more volatile asset values, and as a result, more volatile stock returns. We relate our balance sheet volatility instrumental variables to firms' asset volatility and leverage with the following equation.

$$\sigma_{Ai} = \delta_0 + \delta_1 \sigma_{Bi} + \delta_2 \frac{D_i}{A_i} + \varepsilon_{3i} \tag{13}$$

In order for our instruments to identify the consistent estimates of the coefficients in equation (6), the instruments should not be correlated with the error terms ε_{2i} and ε_{1i}. As previously mentioned, we interpret ε_{2i} as the difference between our estimate of equity volatility and lenders' assessment of firm volatility. We do not suspect that there are convincing reasons why our instruments would be correlated with ε_{2i}. If our instruments are orthogonal to ε_{1i}, this would imply that our instruments are not omitted variables in the loan spread equation. However, we recognize one could argue that lenders, like equity investors, could base their assessment of firm volatility directly on estimates of the volatility of balance sheet variables. And, this would imply that measures of the volatility of balance sheet variables could be included in the regressions as explanatory variables for loan spreads. However, to

[2]For an example of our instrumental variable methodology in another context see research by Blackburn and Neumark (1992). In their analysis these authors use IQ and test scores a measures of unobservable ability and instrument these scores with family background variables which they argue are determinants of ability. In our analysis, estimates of equity volatility are our counterpart to tests scores, and our estimates of balance sheet volatility are our counterparts to family background variables.

the extent that stock prices reflect publicly available financial statement information, we expect estimates of equity volatility should subsume the information that our instrumental variables contain about firm volatility, and that our instruments would not have explanatory power for loan spreads after conditioning on equity volatility.

II. Data Sample and Summary Statistics

We gather data from several sources. We obtain information on corporate loan contracts from the Loan Pricing Corporation's Dealscan database, data on U.S. firms' financial statements from Compustat North America, data from European and other non-U.S. firms' financial statements from Compustat Global, data on U.S. firms' stock prices from Compustat North America security daily, and data on European firms' stock prices from the Compustat Global Security Daily database. We also acquire data on exchange rates from the Federal Reserve Bank of St. Louis web site.

We begin with with the Dealscan database and gather data on individual corporate loans. The data in Dealscan are organized by deal and facility. A loan deal is the contract between a borrower and a lender (or lenders) at a particular date, and may be composed of multiple loan facilities. In our sample about 75 percent of the deals contain one facility, and 20 percent of the loans contain two facilities. It is very likely that pricing and loan contract terms differ across facilities within a deal. Therefore we use each loan facility as one observation. Related research by Strahan (1999), Carey and Nini (2007), and Houston et al. (2007) also conduct their analysis at the loan facility level. For a thorough overview of the syndicated loan market and the Dealscan database, see Strahan (1999).

The Dealscan database has information on a small number of loans in the late 1980's and the number of loans in the database begins to increase in the mid 1990's. There is substantial coverage of the U.S. market throughout the entire time frame while coverage of the European market is largely concentrated in late 1990's and afterwards. Therefore, we begin our estimation sample in 1998 to ensure comparability of our U.S. and European subsamples. We merge Dealscan with Compustat North America, Compustat Global, Compustat North America Security Daily, and Compustat Global Security Daily data for firms' fiscal years that end one year prior to the calendar year in which a loan is originated. Our resulting sample contains 16,585 loan facilities for the borrower country specification and 16,582 loan facilities for the borrower market specification.

We begin by describing the primary variables used in our analysis. The dependent variable in our estimations are corporate loan interest rate spreads. Our measure of corporate loan spreads is Dealscan's All-In-Drawn spread. Dealscan states that the All-In-Drawn spread is a measure of the "overall cost of the loan" that "takes into account, one time and recurring fees," and is measured in basis points. The DEALSCAN database provides the All-In-Drawn spread as a markup over a base rate such as the LIBOR or Euribor rate. We also gather data on interest rate spreads that do not include fees. For a discussion of how to calculate All-In-Drawn spreads see **?**.

We now describe construction of our main control variables. Our first set of control variables are a set of *European dummy* variables which are defined using two different classifications. Our main classification indicates whether a loan is originated by a borrower located in the U.S. or Europe, and the second classification indicates whether a loan is originated in the U.S. or European syndicated loan market. The coefficient on the European dummy variables are estimates of difference in loan spreads paid by U.S. and European borrowers.

Our next main control variables are estimates of borrowers' stock return volatility. We construct our estimates of stock return volatility with data on borrowers' weekly stock returns. For both U.S. and foreign firms we gather stock price data from the Friday of each week. Compustat Security Daily databases do not provide return data for either their the North American or Global databases. Therefore, we construct weekly returns using the formula provided by Wharton Research Data Services (WRDS).[3]

We then use the weekly returns to estimate stock return volatility for each firm for each calendar year. We calculate stock return volatility as the standard deviation of firms weekly stock returns for each calendar year. We then annualize the weekly stock returns by multiplying by $100 \times \sqrt{52}$. We also calculate estimates of borrowers' idiosyncratic and systematic stock return volatility that we use in robustness checks. We use the methodology suggested by Bekaert et al. (2012) to decompose borrowers stock returns into systematic and idiosyncratic components. We then calculate systematic and idiosyncratic stock return volatility by calculating the standard deviation of systematic and idiosyncratic stock returns and then annualize these measures by multiplying by $100 \times \sqrt{52}$.

Our next variables we discuss are our instrumental variables. We construct three instruments for equity volatility using quarterly financial statement data from Compustat North America and Compustat Global. As previously mentioned, our instrumental variables are the standard deviation of the ratio of borrowers' quarterly book equity to assets ratio, and the standard deviation of the ratio of borrowers' quarterly cash and short term investment to assets. We calculate these standard deviations using a rolling window of eight lagged quarterly observations. For example, if we begin our calculation in quarter dated time t, we use quarters dated t through $t-7$ to calculate the standard deviation of the balance sheet

[3] The formula used to construct weekly stock returns for non-U.S. borrowers is is calculated in three steps. First, we convert all non-U.S. dollar denominated stock prices into U.S. dollars. Second, we adjust prices by multiplying observed Friday prices by the daily total return factor and then divide this by the cumulative adjustment factor. We then use adjusted prices to calculate the weekly returns.

variables. We calculate the balance sheet volatilities beginning with data from the fourth quarter of the calendar year through the first quarter of the preceding calendar year. We require that at least six quarterly observations are available. We annualize these observations by multiplying by $100 \times \sqrt{4}$

We now discus our remaining control variables. For similar discussions and examples of control variables used in the literature, see work by Santos (2011), Santos and Winton (2010), and Strahan (1999). For brevity, we do not discuss predictions regarding these variables' coefficient estimates, as these controls are standard in the literature and have been widely used in analysis similar to ours.

We construct multiple control variables for borrower's risk characteristics. We include Tobin's average Q which is interpreted as a market-to-book ratio for firms assets. Or to state it differently, as a measure of the present discounted value of firms' cash flows divided by the book value of total assets. Tobin's Average Q is calculated as the sum total assets plus the market value of equity plus minus the book value of equity minus balance sheet deferred taxes, all divided by total assets. We include measure of leverage which we calculate as long term debt plus debt in current liabilities, all divided by total assets. We calculate a proxy for firm's cash stocks as the sum of cash and short term investments divided by total assets. We measure borrower size with the log of firm's total assets in millions of U.S. dollars. We estimate firms' age as the length of time the borrower has been in the COMPUSTAT North America or COMPUSTAT Global database. We include information on Moody's senior unsecured debt rating at time of loan origination. We include ten separate dummy variables for each individual rating letter grade and an indicator for borrowers without debt rating information. We include dummies for letter grades AAA, AA, A, BBB, BB, B, CCC, CC, C, and D. Dealscan provides our debt rating information at the time of loan origination.

Finally, we also create dummy variables for each year and 2-digit SIC codes that the firm belongs to.

We construct multiple variables describing other non-price loan contract terms common in the literature. We construct a measure of loan size, which is the log of the loan facility amount in dollars. For term loans this would include the entire loan balance received by the borrower at origination, and for revolving lines of credit, this would include the amount of the line of credit that the borrower potentially has available for future use. We create an estimate of a loan's maturity length which is the log of the difference between a loan facility's stated maturity date and start date in days. We measure the size of the loan syndicate as the log of one plus the number of lenders. We include dummy variables that indicate whether a loan is secured, contains performance pricing provisions, has general covenants, or has financial covenants. Since information regarding whether a loan is secured is often missing, we set missing values of the secured indicator equal to zero and include an indicator for missing values. We also include dummy variables indicating each loan type and purpose.

We also acquire a number of country specific measures of investor protection, stock market development, and innovative activity intended to mimic the set of factors that Bartram et al. (2009) find to explain differences in equity volatility between U.S. and foreign firms subject to our data availability constraints. We gather measures of stock market investor protection which includes the, investor protection index and common law indicator from La Porta et al. (2000), and the anti-self dealing index from Djankov et al. (2008). We gather a measure of creditor rights which is the creditor rights index from Porta et al. (2007). We also use two measures of stock market development which include stock market capitalization to GDP ratio and the ratio of total stocks traded to GDP, that we obtain from the World Bank's World Development Indicators (WDI) dataset. Finally, we measure innovative activity with data on the aggregate share of research and development spending as a percentage of GDP from the OECD.

Based on the results and empirical predictions from Bartram et al. (2009), we expect that the measures of the protection of shareholder's legal rights, stock market development, and innovative activity should be associated with greater equity volatility and the measure of creditor rights to be associated with lower equity volatility. Finally, if these variables are correlated with a component of equity volatility that measures firm volatility and risk, then we also expect these variables that are positively (negatively) associated with equity volatility to be positively (negatively) associated with loan spreads.

We briefly summarize the main arguments for the predicted associations between our cross country characteristics and firm volatility and loan pricing. The creditor rights index measures senior creditors power during bankruptcy proceedings. We expect that firms managers may decrease risk taking and firm volatility in countries with strong creditor rights in order to avoid ceding power to senior creditors or losing their positions during bankruptcy proceedings. We expect greater protection of shareholder's legal rights to create a closer alignment between shareholder and managerial interests. Typically, it is thought that firms managers would like to consume prerequisites at shareholder's expenses and entrench themselves in their positions. And, as a result, in environments with fewer shareholder protections, management may reduce risk taking to increase the likelihood they can maintain their positions and continue to consume these prerequisites. Greater protection of shareholder's legal rights reduces managers' ability to pursue these personal objectives and provides incentives for managers to pursue risky but profitable projects. In addition, when there are greater protections of shareholder's rights, firms' often can attract a broader and more diversified ownership which can also increase shareholder's desired risk taking.

We expect that greater stock market development increases risk sharing among opportunities among stock market investors and greater opportunities for diversification which we expect to increase shareholder's desired risk taking similar to greater shareholder legal protections.

We expect that greater development of private credit markets could be associated with either greater or lower equity volatility which differs from the prediction from Bartram et al. (2009) that greater credit market development should be associated with lower equity volatility. We could expect that in countries where creditors have greater influence, that creditors may be able to induce firms to reduce risk taking. However, if more developed credit markets provide investors with greater risk sharing opportunities, we could expect more developed credit markets to be associated with greater volatility and risk taking.

Finally, since innovative activity is generally considered to be a risky form of investment, we expect that greater research and development spending should be associated with greater risk and firm volatility. For a similar, but more complete discussion, see the introduction to Bartram et al. (2009).

We also note that differences in the cross country characteristics that we use and those that Bartram et al. (2009) use are driven by the relevance that the characteristics have to developed countries, and data availability concerns. For example, other characteristics that Bartram et al. (2009) find to be correlated with equity volatility do not differ greatly between the U.S. and well developed European countries in our data sample, hence, these characteristics could not explain differences in loan spreads and equity volatility between the U.S. and Europe. However, one exception is that we use the anti-self dealing index rather than the alternative revised anti-director index from Djankov et al. (2008). This is because Djankov et al. (2008) suggest that "in general, the anti-self-dealing index is preferable to the anti-director-rights index in cross country empirical work." However, we note that the investor protection index is calculated in part with information from the anti-director index.

We conclude by discussing calculations of two measures of the liquidity of firms' stocks. Our first measure is the percentage of weeks with zero returns which Bartram et al. (2009) show is associated with lower equity volatility, and Lesmond, Ogden, and Trzcinka (1999) relate to lower stock liquidity, and greater transaction costs and bid-ask spreads. In addition, we also use the liquidity measure suggested by Amihud (2002), which measures the impact that trading volume has on stock prices and returns. Our concern is that U.S. stocks could be more volatile because U.S. stocks are more liquid, and not because U.S. firms' are riskier or more volatile than European firms. If this is the case, we would expect that controlling for these liquidity measures should reduce our estimates of the difference in equity volatility between U.S. and European firms and limit the ability of equity volatility to explain the difference in U.S. and European loan spreads.

Research by **?** also shows that larger bid-ask spreads, which are likely related to our other liquidity measures, inflate estimates of stock return volatility, which we expect could influence our results if there are large differences in bid-ask spreads between U.S. and European countries. However, we are unable to account for the affects of bid-ask spreads on our volatility estimates because we do not have complete information on bid ask spreads for stocks in our data sample. However, we would actually expect European countries to have less liquid stock markets and higher bid-ask spreads which would inflate estimates of European firms' stock return volatility relative to U.S. firms. We would also expect that this bid-ask spread affect would bias our analysis against finding large enough differences in equity volatility to explain the difference in U.S. and European loan spreads. Furthermore, if bad-ask spreads and the incidence of zero returns are positively correlated for our sample of firms as **?** find in their data set, we would expect larger bid-ask spreads to offset the affect that greater incidence of zero returns and and low liquidity could have on estimates of equity volatility.

III. Results

A. Main Results

A.1. Summary Statistics

We begin by analyzing the average values of variables we use in our analysis by country. Our main hypothesis is that structural differences between U.S. and European countries in stock market investor protection, stock market development, and innovative activity produces large differences in firm volatility between U.S. and European firms, which ultimately results in U.S. firms paying higher loan spreads than European firms. In Table II, we present averages of the firm level control variables we use in our analysis by country and for European firms overall. The statistics show that average loan spreads are 198 basis points on average in the U.S. which are roughly 45 basis points higher than average loan spreads in Europe. However, there is significant variation in average loan spreads among European countries. Loan spreads are relatively high in the United Kingdom and the Netherlands at 180 and 204 basis basis points on average, and substantially lower on average in France and Germany where average loan spreads are 122 and 137 basis points respectively.

The averages in Table II also show that U.S. firms' stock returns are also more volatile than European firms' stock returns. However, the U.K. and Ireland also have high average values of equity volatility that stand out from the remaining European countries. The averages of the remaining firm level variables indicate that on average, U.S. firms in our data sample have more volatile balance sheets, higher values of average Q, and are smaller than European firms. However, these statistics indicate that there does not appear to be large differences in risk factors between the U.S. and Europe firms in our data sample with the exception of equity volatility. Taken together, these averages provide motivation for our hypothesis that there might exist large differences in equity volatility between U.S. and European firms' stocks that could potentially explain the difference in U.S. and European loan spreads.

[PLACE TABLE II HERE]

[PLACE TABLE III HERE]

In Table III we present averages of our measures of shareholder and creditor legal protections, financial market development, and innovation measures by country. These averages provide insight into whether there exist large enough structural differences between the U.S. and European countries that could produce large enough volatility differences to account for the gap in U.S. and European loan spreads. Overall, these averages indicate that the U.S. generally has higher levels of stock market investor protection, lower levels of creditor rights, stock market development, and innovative activity than European countries. The U.S. has the largest value of the investor protection index which is nearly double the average value for European countries. Also, large European countries such as Germany and Italy are among the countries that have the lowest values of stock market investor protection in our data sample, which indicates that there are substantial differences between the U.S. and even large well developed European counties. The U.S. also has the third largest value of the anti-self dealing index which is only lower than than the values for the U.K. and Ireland. Similar to the investor protection index, other large and well developed European countries such as Germany, France, Spain, and the Netherlands have much lower values of the anti-self dealing index than U.S. firms. Overall, common law countries which include the U.S., the U.K., and Ireland have the greatest protections of shareholder rights in our data samples, which Djankov et al. (2008) originally point out. The U.S. has lower overall values of the creditor rights index than other European countries on average. However, there is considerable dispersion across European countries in the creditor rights index. France has the lowest value of the creditor rights index in our data sample, while other large European countries such as Germany, the Netherlands, and the United Kingdom have among the largest values of the creditor rights index in our data sample. Interestingly, the United Kingdom has the largest values of both the creditor rights and anti-self dealing index, which implies that the United Kingdom provides significant protections to both shareholders and debt holders.

The U.S. also has larger average values of stock market and private bond market development than European countries. In particular, the U.S. has substantially larger bond markets and greater stock trading activity than all other European countries with the exception of Switzerland which has high levels of stock trading activity.

Finally, the U.S. has higher average levels of R&D spending as a percentage of GDP than European countries; however, there is significant dispersion in R&D spending among European countries. For example, in contrast to the measures of stock market investor protection and financial market development, among European countries, France and Germany have high levels of the R&D spending to GDP ratio while the United Kingdom has lower levels of R&D spending to GDP ratio.

Overall these statistics provide support for the claim that there are large structural differences between U.S. and even large well developed European countries that could drive differences in risk taking and volatility between U.S. and European firms, and ultimately differences in loan spreads. Finally, we note that taking the averages in Tables II and III together, protections of shareholder rights and financial market development appears strongly related to both equity volatility and loan spreads across countries. The U.S., the U.K., and Ireland have the largest values of investor protection measures and also have greater equity volatility and pay greater loan spreads than other European countries, while firms in countries with weak shareholder protections like Germany have lower volatility and pay lower loan spreads. However, while these statistics are suggestive, a multivariate analysis is needed for insights into our hypothesis.

We next describe our propensity score matching procedure that we use to obtain a matched sample of U.S. and European loans. We use propensity score matching methods because these methods allows us to obtain an estimation sample where U.S. and European borrowers are similar on average in several dimensions, whereas more traditional matching methods may only allow matching borrowers on a small number of factors with more limited success. To implement our procedure, we first estimate a logit regression model where the dependent variable is our European country dummy variable. We explain the dummy variable with all of the firm level risk characteristics in our empirical model other than equity volatility. These include our measures of firms' cash holdings, size, average Q, leverage, age, and individual debt ratings. We also include year and 2-digit SIC industry dummy variables as explanatory variables in our logit regressions. We match U.S. borrowers to European borrowers because of the larger U.S. sample size. The logit regression results are presented in the appendix in Table B.I. We use the logit results to predict the propensity scores, and match firms without replacement using a caliper of 0.005. We use matching without replacement because the U.S. sample is large relative to the European sample, which likely allows us to find a close U.S. matched observation for each European observation. Also, in comparison to matching with replacement, matching without replacement should result in more precise estimation results (see Dehejia and Wahba (2002)). However, we note that all of our results are robust to using alternative matching methodologies.

[PLACE TABLE B.I HERE]

We present the mean values of the variables we use in our analysis for our matched U.S. and European country samples in Table IV. We do not present averages by country as nearly all European observations enter the matched sample, and the only substantial differences between the full and matched sample averages are for the U.S. subsample. We first point out that there is a statistically significant difference in loan spreads and equity volatility between U.S. and European firms in our matched samples. The difference in loan spreads is roughly 45 basis points in our matched sample, and there is a about a 10 percentage point difference equity volatility in our matched sample. The statistics for our matched sample also indicate that we are able to closely match average values of U.S. and European borrowers for all of our main control variables that we match on, and that European and U.S. firms are similar in all of these dimensions on average.

[PLACE TABLE IV HERE]

We also note that we only derive one matched sample of borrowers that we use for all estimations. Hence, if we use drop observations from the smaller matched sample, we would not necessarily include accurate matched U.S. observations for each European observation. However, in these cases, we expect that there is still considerably more overlap in the overall distribution of U.S. and European borrowers risk characteristics in comparison to our full sample, and that controlling for our observable risk factors in our regressions would adequately mitigate concerns about imperfect matching among the remaining observations. Bartram et al. (2009) follow a similar approach and also claim that controlling for observable matching characteristics in regressions mitigates the impact of imperfect matching on their analysis.

A.2. Main Estimation Results

We present our main estimation results in Table V. In the first two columns, we present results for OLS specifications where we include all control variables but exclude estimates of stock return volatility, and we include OLS specifications where we control for equity volatility and all control variables in the third and fourth columns. The results include specifications that we estimate with the full sample in the first and third columns and matched sample in the second and fourth columns. These results indicate that there is a negative and statistically significant difference in loan spreads between U.S. and European countries of about 60 basis points in the first two columns which declines to roughly 50 basis point difference when we control equity volatility. These results indicate that controlling for equity volatility partially reduces our estimates of the loan spread difference. However, consistent with our main hypothesis, we find that there is still a statistically significant difference in loan spreads even after controlling for equity volatility, which we expect is due to the error in measuring firm volatility with equity volatility. We also note that our estimates of the association between equity volatility and loan spreads is 1.13 in the full sample and roughly 1.60 in the matched sample.

[PLACE TABLE V HERE]

We present our main instrumental variable estimates in Table VI. In the first and second columns we present first stage estimates from our full and matched samples, and we present our second stage results in the third and fourth columns. The first and third columns contain our full sample estimates and our second and fourth columns contain our matched sample estimates. The first stage estimates indicate that equity volatility is roughly 7 to 8 percent lower in Europe. This implies that equity volatility in the U.S. would be about 22 percent greater than than the average equity volatility of 35 percent for European firms. This is close to the average difference in equity volatility between U.S. foreign firms of 25.7 percent found by Bartram et al. (2009). In addition, the first stage estimates indicate that our instrumental variables have the predicted positive association with equity volatility. However, the coefficient of the standard deviation of cash to assets is not statistically different from zero in our matched sample. The second stage estimates indicate that there is no statistically significant difference in loan spreads between loans made to U.S. and European borrowers, which is consistent with our hypothesis that volatility differences are responsible for the observed difference in U.S. and European loan spreads in our matched sample.

The results in Table VI also indicate that coefficient estimates for equity volatility are 6.20 in our full sample estimates and 7.58 in our matched sample estimates. In comparison to our OLS estimates, our IV estimates suggest that the coefficient estimates for equity volatility are downward biased by about a factor of 5.

[PLACE TABLE VI HERE]

We also note that we include both OLS and instrumental variable estimates of the difference in loan spreads between the U.S. and European syndicated loan markets for full and matched sample for specifications that match those in our main estimates in the bottom panels of Table V and Table VI. Consistent with our main results for the borrower country sample, we find a statistically significant difference in loan spreads between U.S. and European loan markets in OLS estimates, and no statistically significant difference in loan spreads in our instrumental variable estimates.

We next briefly discuss the coefficient estimates for our remaining control variables in Table V and Table VI. The results suggest several substantial differences between the OLS and instrumental variable estimates. First, the coefficient estimates for firm size are statistically different from zero in our OLS estimates but is not statistically different from zero in our IV estimates. Our coefficients estimates are statistically different from zero for leverage and Average Q in our OLS and IV estimates, but smaller in absolute value in our IV estimates than in our OLS estimates. The coefficient estimates for age decrease in absolute value going from our OLS to IV estimates, but age is not statistically different from zero in either our OLS or IV matched sample estimates.

We note that our coefficient estimates for borrowers' cash holdings are positive and statistically different from zero in our OLS estimates but are negative and negative but not statistically different from zero in IV estimates. The OLS results contradict standard corporate finance theory which predicts that firms with more liquid balance sheets pose lower rather than greater credit risk. However, our IV estimates are consistent with the prediction that balance sheet liquidity lowers borrower risk. These results suggest that the OLS coefficient estimates for cash holdings are biased due to the correlation between cash holdings and firm volatility. One explanation for these results is that cash holdings are correlated with firm volatility because riskier more volatile firms hold more liquid assets for precautionary savings motives as Acharya et al. (2011) suggest. Overall, our results indicate that controlling for firm volatility with our instrumental variable model has a substantial impact on inferences made about what determines syndicated loan pricing.

A.3. Characterizing the Bias in OLS Estimates

We next attempt to assess whether the bias in our OLS estimates of β_3, which measures the difference in U.S. and European loan spreads, and ρ_1, the coefficient for equity volatility in our empirical models, are consistent with our prior predictions and our hypothesis that β_3 is equal to zero. Our probability limits for the estimates of $\hat{\beta}_3$ and $\hat{\rho}_1$ in equations (8) and (10) indicate that if the true value of β_3 is equal to zero, that the bias in $\hat{\beta}_3$ should be proportional to the noise to signal ratio. Since, the bias in $\hat{\rho}_1$ is proportional to one minus the noise to signal ratio, we can compare estimates of noise to signal ratio that we can derive from estimates of β_3 to estimates of the noise to signal ratio that we can derive from estimates of ρ_1. If we obtain estimates of the noise to signal ratio that are similar whether we base the estimates on our estimates of either $\hat{\beta}_3$ or $\hat{\rho}_1$, then this would suggest that the bias implied by our OLS estimates of the difference in U.S. and European loan spreads are consistent with the bias implied by our OLS and IV estimates of the equity volatility coefficient. This would be important to assess, because estimates of the noise to signal ratio derived from OLS estimates of β_3 do not depend on strict identifying assumptions, and only depend on our main hypothesis that β_3 is equal to zero. In contrast, the estimates of the noise to signal ratio derived from our OLS and IV estimates of ρ_1 critically depend on the identifying restrictions we use to generate all of our IV model's coefficient estimates. Hence, this would tell us whether our OLS and IV results are all consistent with our hypothesis that β_3 is equal to zero. Substantially different estimates of the noise to signal ratio would cast doubt on whether the true value of β_3 is equal to zero, and the assumptions made in our analysis.

We can calculate the noise to signal ratio for equity volatility by using the OLS coefficients for equity volatility in the third and fourth columns of Table V as values of $\widehat{\rho_1}$, and use the instrumental variable estimates in the third and fourth columns of Table VI as estimates of the true value of ρ_1. We calculate the noise to signal ratio as one minus the ratio of the OLS coefficient estimates to the corresponding full or matched sample IV coefficient estimates. Our estimates of the noise to signal ratio are .81 for both the full and matched samples, which of course, imply a signal to noise ratio of .19.

If the true value of β_3 is equal to zero, then we can estimate the noise to signal ratio as the ratio of the OLS estimates of the difference in U.S. and European loan spreads in the third and fourth columns to the OLS estimates of the difference in U.S. and European loan spreads in the first and second columns of Table V respectively. The OLS estimates from the first and second columns represent estimates of $\widehat{\beta_3^{OVB}}$ from equation (2), and the estimates from the third and fourth columns represent OLS estimates of $\widehat{\beta_3}$ from equation (8). We calculate the noise to signal ratio as follows

$$\frac{\widehat{\beta_3}}{\widehat{\beta_3^{OVB}}} = \frac{\beta_1 \left[\phi_{\sigma_A,E_i}\right](1-\pi_1)}{\beta_1 \phi_{\sigma_A,E_i}} = (1-\pi_1) \tag{14}$$

Our estimates of the noise to signal ratio are roughly .83 and .80 for the full and matched samples respectively. These estimates indicate that the amount of bias we find in our estimates of the coefficient for equity volatility are roughly consistent with bias in the OLS estimates of the difference in U.S. and European loan spreads under the assumption that the true value of β_3 is equal to zero.

We next use our OLS and IV coefficient estimates for equity volatility, and equation (8) to estimate a signal to noise ratio for our original estimates of stock return volatility without partialling out or removing information in equity volatility that is common to our other control variables. This would tell us whether our previous estimates of the signal to noise ratio are reasonable. These estimates should be larger than our previous estimates because information about firm volatility and risk common to both equity volatility and other control variables is attributed to equity volatility in these estimates. In addition, the difference between our other estimates of the signal to noise ratio and these estimates will inform us about the degree of common information about firm volatility and risk embedded in equity volatility and our other control variables. Large differences in these signal to noise ratio estimates would suggest that there is a large correlation between firm volatility and our remaining control variables and would also justify the substantial biases we observe in the OLS coefficient estimates for our other control variables.

We use our OLS estimates as an estimate of $\hat{\rho}_1$, and our IV estimate as a stand in for the true value of ρ_1 which is unobservable. We estimate the denominator of equation 8 by calculating the variance of the residuals from a regression of equity volatility on the remaining control variables in our main estimations. We denote this estimate by $VAR(\sigma_E^{*2})$. We then use these estimates to solve for $\alpha_1^2\,(q^{*11})$ in equation (9) as

$$V = \frac{(\widehat{\rho}_1)\,(VAR(\sigma_E^{*2}))}{(\rho_1)} = \alpha_1^2\left(q^{*11}\right)^{-1} \tag{15}$$

We estimate $\sigma^2_{\varepsilon_2}$ by subtracting our estimate of $\alpha_1^2 \left(q^{*11}\right)^{-1}$ from our estimate of $VAR(\sigma_E^{*2})$. Finally, we estimate the signal to noise ratio for observed equity volatility as one minus the ratio of our estimates of $\sigma^2_{\varepsilon_2}$ to estimates of the variance of our original observed equity volatility. We present estimates of the signal to noise ratio for each set of our main instrumental variable estimates in the bottom row of Table VI. We obtain an estimate of 50 percent in our full sample estimates and estimates around 40 percent in our matched sample. These estimates of the signal to noise ratio indicate that equity volatility contains significant information about firm volatility, but also contains significant error in measuring firm volatility and risk. In addition, these estimates are significantly larger than our previous signal to noise ratio estimates, which does not indicate that our other signal to noise ratio estimates are unreasonable. Second, the difference in these ratios indicate that there is substantial variation in equity volatility related to firm volatility and risk that is correlated with other regressors, which is consistent with large biases in OLS estimates of our other coefficients such as β_3.

A.4. Are Differences in U.S. and European Firms Equity Volatility Measuring Differences in Firm Volatility?

Another concern with our results is that our estimates of β_3 could be statistically insignificant because differences in U.S. and European firms equity volatility volatility is due to sources other than firm volatility or borrower risk. If this was the case, then the coefficient multiplying the European dummy variable in equation (6) would be similar to the coefficient for leverage. For example, if the European dummy variable was included in equation (3) and was multiplied by a coefficient α_3, the then the coefficient multiplying the European dummy variable in equation (6) would be $\rho_3 = \beta_3 - \frac{\beta_1 \alpha_3}{\alpha_1}$. Using the notation for the probability limit for leverage, the probability limit for ρ_3 would be

$$\text{plim}\hat{\rho}_3 = \text{plim}\widehat{\beta_3 - \beta_1 \frac{\alpha_3}{\alpha_1}} = \left(\beta_3 - \beta_1 \frac{\alpha_3}{\alpha_1}\right) + \beta_1 \left[\phi_{\sigma_A, E_i} + \frac{\alpha_3}{\alpha_1}\right](1 - \pi_1) \tag{16}$$

If this is the case, then ρ_3 could be equal to zero even if β_3 is less than zero. If the European dummy variable belongs in equation (3) and ρ_3 is equal to zero, then the ratio of $\widehat{\rho_3}$ to $\widehat{\beta_3^{OVB}}$ will also be equal to the noise to signal ratio.

$$\frac{\widehat{\rho_3}}{\widehat{\beta_3^{OVB}}} = \frac{\beta_1 \left[\phi_{\sigma_A, E_i} + \frac{\alpha_2}{\alpha_1}\right](1 - \pi_1)}{\beta_3 + \beta_1 \phi_{\sigma_A, E_i}} = (1 - \pi_1) \tag{17}$$

Therefore, while comparing noise to signal estimates can help infer whether our OLS and IV estimates are consistent with each other, these estimates cannot help us discern whether we are estimating β_3 or ρ_3. Nevertheless, we can analyze what impact inclusion of the European dummy variable in equation (6) could have on our inferences. We know that if β_3 is not equal to zero, the term $\beta_1 \frac{\alpha_3}{\alpha_1}$ needs to be just large enough to repeatedly offset the true value of β_3 to set ρ_3 equal to zero. For example, assuming that our IV coefficient estimates for equity volatility represent the true value of $\frac{\beta_1}{\alpha_1}$, the full sample IV estimates for $\frac{\beta_1}{\alpha_1}$ indicate that each one percent difference in U.S. and European firms equity volatility due to factors other than risk and volatility would imply a -6 basis point difference in β_3. To achieve a -30 basis point value of β_3 consistent with the results from Carey and Nini (2007), there must be a 5 percent difference in equity volatility between the U.S. and Europe that is unrelated to firm volatility and risk. A 5 percent difference in in equity volatility would amount to roughly 60 percent of the total difference in equity volatility between the U.S.

and Europe implied by our first stage estimates.

Next we analyze whether differences in U.S. and European equity volatility and loan spreads are correlated over time. We expect that if differences in U.S. and European firms' stock return volatility is due to variation in firm volatility and risk rather than other non-volatility non-risk sources, that time series variation in the differences in U.S. and European firms equity volatility should be closely related to differences in U.S. and European firms loan spreads. We would expect that if differences in equity volatility are unrelated to firm volatility and risk, that the time series correlation between differences in loan spreads and differences in equity volatility would be weak, as there is no reason to expect that non-risk related sources of equity volatility would be correlated with loan spreads over time.

For this analysis, we calculate average equity volatility and loan spreads separately for U.S. and European firms for each year for observations in our full and matched U.S. and European sample. This is the same data that we plot in Figures (1) and (2). We present results for the full sample in the first two columns and results for the matched sample in the third and fourth columns. We then use this data to estimate time series regressions with the difference in average U.S. and European loan spreads as the dependent variable and average difference in U.S. and European equity volatility as the explanatory variables. We present these estimates in Table VII in the second and fourth columns. We only include a constant term in the regressions in the first and third columns. In addition, we use averages for all years in the regressions in the top panel and exclude the years 1998 and 1999 in the regressions in the bottom panel. We exclude 1998 and 1999 in the bottom panel as the relationship appears to strengthen after 2000 in Figure (2). However, we note that we have fewer observations for European firms in 1998 and 1999 which could result in less precise estimates of average loan spreads and volatility and could be responsible for the weaker relationship in those years.

These estimates indicate that loan spreads are lower on average in Europe and that the difference in loan spreads are slightly smaller than our estimates of the difference in loan spreads in Table V. We find a coefficient on equity volatility differences in the third and fourth columns which are large and similar to the coefficient estimates in our instrumental variable estimates. We also find a large R-squared in each estimates in the second and fourth columns. This analysis indicates that time series variation in differences in equity volatility and loan spreads between the U.S. and Europe are closely related and provides support for the claim that differences in equity volatility are driven by firm volatility and risk rather than non-risk sources.

A.5. Robustness Checks for Main Results

We also provide results for robustness checks for our main results in the appendix. We present OLS and instrumental variable estimates of our main specifications separately for our U.S. and European subsamples. These results indicate that equity volatility has a statistically significant association with both U.S. and European loan spreads, and that OLS estimates of the association between equity volatility and loan spreads is downward biased for both U.S. and European subsamples. These results indicate that firm volatility is an important determinant of both U.S. and European loan spreads and further supports our claim that differences in firm volatility could be responsible for differences in U.S. and European loan spreads.

We also present estimation results where we re-estimate our main OLS and instrumental variable specifications, but include individual European dummy variables for different time periods. These results indicate that there is a statistically significant difference in loan spreads in OLS estimates for subperiods of our data set, and that there is no statistically significant difference in loan spreads in any subperiod after accounting for the error in measuring firm volatility with equity volatility. We also present results that show our OLS and IV estimates of the coefficient estimates on the European dummy variable are nearly identical for a subsample of our dataset where we drop the post 2008 financial crisis period. These results also indicate that the large differences in equity volatility during the crisis period that we observe in Figures (1) and (2) are not overly influencing our results.

We also replicate our main results in the appendix using idiosyncratic equity volatility as our measure of equity volatility. We estimate these specifications because Bartram et al. (2009) show that equity volatility is largely responsible for difference in equity volatility between U.S. and European firms, and that idiosyncratic equity volatility is more closely related to risk than systematic equity volatility. These results are nearly identical to our main results. However, the noise to signal ratios that we calculate from our OLS and IV coefficient estimates of β_3 are equal to .88 for both full and matched sample estimates, the noise to signal ratios we estimate from ρ_1 are equal to .88 and .87 in our full and matched sample respectively. These are estimates are greater than our previous noise to signal ratio estimates from our original results. In addition, signal to noise ratio estimates for our original estimates idiosyncratic equity volatility without removing information correlated with our other control variables are also lower than our equivalent estimates for total equity volatility. These estimates indicate that systematic equity volatility included in total equity volatility provides additional information about firm volatility and risk beyond the information included in idiosyncratic equity volatility. However, these results indicate that idiosyncratic volatility contains enough information on firm volatility differences between the U.S. and Europe to explain the difference in U.S. and European loan spreads.

A.6. Cross Country Characteristics

We present reduced form, first, and second stage estimation results in Table VIII from instrumental variable estimates where we model loan spreads as a function of all of our control variables and our cross country factors measuring investor protection, financial market development, and innovative activity. We present results for full and matched sample estimates. We include our full sample results in the top panel and matched sample results in the bottom panel. We drop the observations in both our full and matched samples where information for a particular characteristic is missing. For brevity, we only present estimates for coefficients for equity volatility and our cross country characteristics. We include reduced form estimates rather than OLS estimates such as those we present in Table V, because we would like to focus on the association between these factors have with loan spreads through their covariance with equity volatility. However, the reduced form results are practically identical to estimates from OLS specifications we control for these country level factors but omit equity volatility. The only difference is the inclusion of our instrumental variable estimates in the reduced form.

These reduced form and first stage results show that each of our cross country characteristics has a large and statistically significant association with both loan spreads and equity volatility, and that these associations are consistent with ex-ante predictions except for the creditor rights measure. The creditor rights index does not have a statistically significant association with loan spreads in the reduced form results from the matched sample. However, because the U.K. has particularly high levels of both creditor rights and the anti-self dealing index, we estimate a specification where we control for both the creditor rights and anti-self dealing index because we expect that high levels of shareholder legal rights and creditor rights in the U.K. could bias these variables regression coefficients. The results for this specification in the fourth column indicates that the creditor rights index has a large and negative association with loan spreads in the reduced form stage compared to the specification where we only control for the creditor rights index. In addition, we note that the coefficient estimates for the anti-self dealing index and creditor rights index are also all greater in absolute value in the reduced form and first stage than in the specifications where we control for each measure individually. We also estimate unreported specifications where we control for creditor rights and either the investor protection index or the common law indicator. However, the creditor rights coefficients in the reduced form and first stage estimates do not change. However, Djankov et al. (2008) indicate that the anti-self dealing is a better measure of stock market investor legal protections, and may more adequately measure shareholders' legal protections.

In the second stage estimates, each of these cross country measures has no statistically significant association with loan spreads except for the measure of stock market capitalization to GDP. However, the second stage coefficient for the stock market capitalization to GDP is less than half of the size of the coefficient in the reduced form results. We suggest that these results are likely to due large stock market capitalization in several European countries, which results in a weaker relation between stock market capitalization to GDP and equity volatility as compared to the relation between other cross country factors and equity volatility.

Taken together with the average values of our country level factors from Table II, these results imply that pronounced differences in several of these factors between the U.S. and large European countries such as France, Germany, Italy, and Portugal imply differences in loan spreads of well over 50 basis points and differences in equity volatility of over 6 percent. And our results that equity volatility can explain the difference between these factors and loan spreads further supports the claim that there are large structural differences between the

U.S. and large well developed European countries that could reasonably generate differences in firm volatility and loan spreads that we observe between the U.S. and Europe.

[PLACE TABLE VIII HERE]

A.7. Liquidity Differences

In this section we assess whether liquidity differences rather than differences in firm volatility could be driving our estimates of the difference in equity volatility between the U.S. and European countries. We use two measures of liquidity in this analysis, the fraction of weeks during the year with zero returns, and the Amihud (2002) liquidity measure.

We begin by summarizing overall liquidity difference between U.S. and European firms. In our full data sample U.S. firms have 2.7 percent of weeks with zero returns while European firms have 2.8 percent of weeks with zero trades, and in the matched sample U.S. firms have 1.1 percent of weeks with zero trades and European firms have 2.8 percent of weeks with zero trades. These statistics indicate that on average U.S. and European firms stocks have similar levels of trading frequency in our full sample, but that European firms have slightly stocks that trade slightly less frequent than the stocks of comparable U.S. firms. However, compared to the data set used by Bartram et al. (2009), both U.S. and European firms in our sample have substantially lower frequencies of zero returns, and there are smaller differences in zero return frequency between U.S. and European firms in our data sample. The average values of the Amihud (2002) liquidity measure in our full sample are .89 for European firms and .61 for U.S. firms in our full sample, and are .66 for European firms and .22 for U.S. firms in our matched sample. In addition, we note that we scale our Amihud

(2002) liquidity measure by 10^9 rather than 10^6 as Amihud does in their analysis because stocks have very low levels of Amihud's liquidity measure in our sample.[4] These statistics indicate that U.S. firms stocks are slightly less liquid than European firms stocks in the full sample, but that U.S. firms stocks are more liquid than those of comparable European firms. However, these statistics indicate that stocks for both U.S. and European firms are highly liquid and liquidity differences between U.S. and European firms in our data sample are smaller in our sample compared to the stocks included in broader samples used previous research.

If liquidity differences unrelated to firm volatility and risk are responsible for differences in equity volatility between U.S. and European firms in our data sample, than controlling for liquidity should reduce our estimates of the differences in U.S. and European equity volatility, and possibly produce statistically significant estimates of the coefficient multiplying our European dummy variable. For example, if our estimates of the U.S. and European loan spread difference reflect estimates of ρ_3 in in equation (16), then we expect that controlling for liquidity would reduce the size of the term, $\beta_1 \frac{\alpha_3}{\alpha_1}$, while leaving β_3 unchanged, which should result in negative and statistically significant estimates of ρ_3. This would be because we do not expect liquidity differences to be associated information in equity volatility that measures firm volatility and risk.

We include these results in Table IX. We present results we re-estimate three variations of main IV specifications from Table VI. We include these results in three panels, and only show our coefficients for the European dummy variable, equity volatility, and our liquidity

[4] Amihud (2002) calculates .337 as the average value of their liquidity measure in their data sample, and therefore, our average values would be less than .001 in our data sample for both U.S. and European stocks. However, we point out that our sample includes large firms that likely have liquid stocks from recent years while Amihud's data sample spans the years 1964-1997 where stock market liquidity was lower than in recent years. For example, stock tick size decreased to 1/16 in 1997 and stock quotes were decimalized in 2001 increased stock market liquidity in the U.S.

measures. In the top panel we include results where regress loan spreads on all of our control variables including equity volatility, and also include the percentage of weeks with zero returns. These results indicate that although zero returns are correlated with both lower total stock return volatility, and that controlling for liquidity differences with zero returns has no significant affect on estimates of he coefficient on the European dummy variable. In the middle panel, we present results from specifications where we regress loan spreads on all of our control variables and equity volatility using a data sample where we screen out all firms with any instance of zero returns for each year. Screening out firms with zero returns eliminates roughly half of both our U.S. and European samples, and should result in sample of U.S. and European firms with smaller liquidity differences. Again, these results are similar to our other results and again suggest that liquidity differences to not appear to be responsible for the differences in equity volatility between the U.S. and Europe. In third panel we present results for specifications identical to those in the top panel with the exception that we control for liquidity with the Amihud (2002) liquidity measure rather than the percentage of weeks with zero returns. Again, these results indicate that controlling for liquidity with the Amihud (2002) measure does not affect our main results. We find that the Amihud (2002) measure is associated with both greater total stock return volatility in our full sample, and only has a weak and statistically significant association with total stock return volatility in our matched sample results.

[PLACE TABLE **??** HERE]

[PLACE TABLE **??** HERE]

A.8. Loan Currency

In this section we analyze whether the currency the loan is denominated in affects our main results. There are two reasons why the currency the loan is denominated in could affect loan spreads. First, if arbitrage is not sufficient, the covered interest parity condition may not be satisfied in the syndicated loan market, which could create a difference in risk spreads for equivalent loans denominated in different currencies. However, Carey and Nini (2007) indicate that market participants suggest because arbitrage is effective for loans denominated in major currencies and that it is likely that the covered interest parity condition is satisfied in the global syndicated corporate loan market.

A second reason is that there could be a large expected future depreciation or appreciation of a currency the loan is denominated in, which could also create differences in risk spreads in different currencies even if the covered interest parity condition holds. An expected future depreciation or appreciation would affect loan spreads because fluctuations in the value of the currency would affect lenders return on the loan in different currencies. For example, investors would demand higher interest rates on loans denominated in currencies that are expected to depreciate prior to lenders receiving the loans principle repayment or spread payments.

We address these concerns multiple ways. First, we estimate our main models for a subset of loans denominated in U.S. dollars. However, we only have 343 dollar denominated European loans which is a small fraction of our total European loan sample. Therefore, we follow the approach of Carey and Nini (2007) and convert loan spreads denominated in Euros and British Pounds to U.S. dollars. We assume that the principle amount for all loans are repaid at maturity, and that spread payments are annual. We convert all spread payments to dollar spread payments using forward exchange rates. We discount all spread payments using the risk free rate. However, similarly to the results from Carey and Nini (2007), we do not find that adding a risk premium to the interest rate used for discounting affects our calculations. We calculate dollar spreads as the dollar loan spread that would equate future discounted spread payments in dollars to future discounted spread payments in Euros. We also note, that we only have forward exchange rate data for years $t+1$, $t+2$, $t+3$,$t+4$, and $t+5$ after the loan origination date, and our data on forward rates for years $t+2$, $t+3$,$t+4$, and $t+5$ does not begin until 2004. As a result, we can only convert spreads for loans with a maturity of less than 5 years. We are able to convert loan spreads for 739 Euro and British Pound loans, which is 59 percent of our non-dollar denominated European loan sample. We find the absolute value of the difference in the dollar loan spreads and the original loan spreads in Euros or British Pounds has a median of .98 basis points and a mean of 1.66 basis points, with a 90th percentile of 3.57 basis points, a 95th percentile of 6.23 basis points with a maximum difference of 23 basis points. Overall, these calculations suggest that there are not large expected future appreciations or depreciations of the U.S. Dollar, Euro, or British Pound over our sample time period that could create large differences in loan spreads in different currencies.

Then, we attempt to approximately convert our all-in-drawn loan spreads into multiplicative spreads. We attempt to approximate multiplicative spreads because **?** show that only multiplicative spreads can be compared across different currencies when covered interest parity holds. In terms of the notation from our model in equation (1), multiplicative spreads can be written as

$$M_{i,f} = \frac{1+r_i}{1+r_f} - 1 = \frac{r_i - r_f}{1+r_f} \tag{18}$$

In equation (XI), the maturity for the risk free interest rate must be equivalent to the maturity length of the loan and also be measured in the same currency as the loan's interest rate or risk spread. We can attempt to approximate multiplicative spreads by dividing by one plus the base rate for each loan; however, this would only be approximately accurate for loans with a maturity of one year or less. However, we calculate multiplicative spreads for all maturities. Or reasoning is that dividing by one plus the loans base rate would reduce the effect that expected future depreciations or appreciations would have on differences in loan spreads for loans denominated in different currencies. This would be particularly true when depreciations or appreciations are largely expected within the year following the loans' origination with exchange rates expected to remain constant over the remaining life of the loan. Large expected fluctuations in the value of the currency a loan is denominated in after one year would still create a wedge between multiplicative spreads in different currencies.

We calculate multiplicative spreads by dividing our all-in-drawn spreads by one plus an approximation to the loans' base rate. Our approximation to the base rate is the one year value of the loans base rate that is designated by Dealscan. We use average value of the base interest rate for the month in which the loan facility begins, in where the base rate interest rate is denominated in the loans' stated currency. Dealscan states that the base rate for each loan is usually a three month or one year measure of the base rate interest rate, but they also state that they do not receive information on the exact maturity used as the base rate. We use the one year interest rate because loan spread payments are often made annually. Our calculations indicate that multiplicative spreads are lower than absolute loan spreads by roughly 5 basis points for European loans and 7 basis points for U.S. loans.

We present OLS and IV estimates for our dollar and dollar converted loan spread sample in Table X. We present results for the dollar denominated subsample of U.S. and European loans in columns (1)-(4) and we present results for our data sample of dollar denominated and dollar converted U.S. and European loans in columns (5) through (8). We include full sample results in the odd numbered columns and matched sample results in the even number columns. OLS results are in columns (1), (2), (5), and (6) and instrumental variable results are in columns (3), (4), (7), and (8). Consistent with our main results, the OLS results indicate large estimates of the difference in U.S. and European loan spreads loan spreads in each subsample. And, as with our main results, we again find no difference in U.S. and European loan spreads in our IV results. We also note that our dollar and dollar converted loan sample contains 67 percent of our full data sample.

We present results for multiplicative spreads in table **??**. We include results for the full sample of multiplicative spreads in columns (1)-(4) and for our sample of one year maturity loans with multiplicative spreads in columns (5)-(8). We again include full sample results in the odd numbered columns and matched sample results in the even number columns. OLS results are in columns (1), (2), (5), and (6) and instrumental variable results are in columns (3), (4), (7), and (8). The results indicate that there are still statistically significant differences in U.S. and European loan spreads in our all of OLS results and that there is no statistically significant difference in multiplicative loan spreads in our instrumental variable estimates. We do find smaller differences in multiplicative spreads for our sample loans with a maturity of one year or less, however, the first stage coefficient estimates for the European dummy variable which we include in the bottom panel of the table indicates that there are all smaller differences in equity volatility between these U.S. and European subsamples.

[PLACE TABLE X HERE]

A.9. Default

In this section we examine whether our main results are robust to including estimates of firm default probabilities that incorporate information on stock return volatility as additional explanatory variables. Our default probability estimates are vendor-supplied and are similar to measures that are used by Campbell et al. (2008) and are calculated, in part, with information about stock return volatility. These measures include a *Merton* model based on an empirical implementation of the Merton distance to default model, and an *Alternative* default probability estimate generated from empirical default prediction model.

In Table XII we present results just for the matched sample of U.S. and European observations. In the first and second columns we present OLS results, and in the third and fourth columns we present IV results. The first and third columns use *Merton* variable, and the second and fourth columns use *Alternative* variable.

Our OLS results show that the coefficient estimates for default probability variables do not have a statistically significant association with loan spreads. Our main variables of interest are quantitatively and qualitatively similar to our main OLS results, the European dummy coefficient is negative and significant, and the total volatility coefficient is positive and significant.

In our IV estimates, both the *Merton* and the *Alternative* variables have a negative and statistically significant association with loan spreads. It is not intuitive that there is a negative association between the default probabilities and loan spreads. However, we note that both default probability measures contain information about equity volatility and could include information on the component of equity volatility contained in ε_2. Therefore, we could expect that variation in these default measures could be contained in ε_2 and would produce coefficients for these default measures that are less than these variables true coefficient estimates.

[PLACE TABLE XII HERE]

Taken together, these results indicate that our empirical model better explains loan spreads than standard alternative measures of credit risk generated with information about equity voaltility. However, we note that this is not surprising, because we intend our methodology to provide a linear approximation to a general credit risk model that and alleviate problems due to error in measuring credit risk. We also allow point out that estimates of the association between risk factors in our empirical model and loan spreads are allowed to freely vary and are determined by the data, while these default probability estimates impose strict restrictions on the association between the underlying factors used to generate the default probability estimates and loan spreads in our estimations. Therefore, it is not surprising that our less restrictive model better explains loan spreads than these more restrictive default probability estimates.

A.10. Base Rate, Fees, Loan Contract Terms, and Leverage Interaction Terms

Next, we examine whether our results are robust to four sets of robustness checks. We examine whether differences differences in base rates that loan spreads are based upon, whether fees are included in loan spreads, controlling for loan contract term, and including interactions between leverage and equity volatility affect our main results. For brevity, we do not tabulate these results here, but include these results in the appendix.

In the appendix we present results for our base OLS and IV specifications that control for equity volatility where we only include loans with LIBOR base rates. One could expect that large differences in LIBOR base rates and the other widely used base rates such as the Euribor base rate could result in differences in loan spreads. For example, if one base rate is expected to be greater than other base rates over the loans tenure, we could expect that risk spreads could be adjusted upward or downward to compensate for expected differences in base rates. However, the results for these specifications indicate large differences in loan spreads in the OLS specifications and no statistically significant difference in loan spreads in the IV specifications, which indicates that differences in LIBOR and other base rates are not driving our main results.

We estimate OLS and IV specifications we measure loans spreads with loan fees are omitted from calculation of loan spreads. We include these specifications because fee income information is often missing in the Dealscan database, which could make comparing loan spreads problematic. Fees information is included for about 5362 observations in our data set which includes 369 European loans. Encouragingly, OLS specifications again indicate that European borrowers pay significantly lower spreads on average than U.S. borrowers, and in our instrumental variable results we do not find we find a significant difference in loan spreads between the U.S. and Europe.

We also present results for specifications where include measures of non-price loan contract terms as additional explanatory variables. In unreported summary statistics, we find that loans to European borrowers less frequently contain convents and performance pricing provisions, and are less frequently collateralized than loans to U.S. borrowers. Loans originated to European borrowers also have slightly longer maturities and have more participating lenders. We include results for specifications that include our control variables for loan contract terms to examine whether differences in the use of non-price loan terms by U.S. and European borrowers materially affects our analysis. However, overall we again find that the coefficient on our European dummy variable is negative and statistically significant in our OLS results and not statistically different from zero in our IV results.

In our final robustness checks, we examine whether the association between equity volatility and loan spreads depends on firms leverage. A firms leverage may influence the strength of the association between equity volatility and loan spreads because firms' with greater debt loads may be more likely to default or enter financial distress for a given level of volatility. Our summary statistics for our full and matched sample indicate that U.S. and European firms have similar levels of leverage. Therefore, we do not expect that differences in leverage would create differences in the impact of volatility between U.S. and European firms. However, interacting equity volatility with leverage could alter our estimates of the difference in U.S. and European loan spreads by altering our estimates of the overall association between loan spreads and equity volatility. We estimate OLS and IV specifications with equity volatility and augment these specifications with an interaction term between leverage and stock return volatility. In these instrumental variable models, we instrument the interaction term between leverage and equity volatility with interaction terms between leverage and our balance sheet volatility variables.

In OLS estimates we find that there is still a large negative and statistically significant coefficient on the European dummy variable and that the leverage and equity volatility interaction term is positive and statistically different from zero as we would expect. The OLS estimates also indicate that the equity volatility coefficient is much smaller as compared to our OLS estimates, however, as equation (8) indicates, this is likely due to greater attenuation bias that results from the correlation between the linear equity volatility term and the interaction term. Our instrumental variable results indicate that there is no statistically significant difference in U.S. and European loan spreads and that the leverage and equity volatility interaction term coefficient is also not statistically different from zero. Overall, these results are consistent with the claim that equity volatility measures overall firm volatility and that the association between equity volatility and loan spreads does not depend on firms financial policy.

[PLACE TABLE B.VII HERE]

B. Digression on our Methodology

Finally, we note that one could question why we only instrument for equity volatility volatility in our analysis, and question why we are not directly concerned about measurement error in other variables such as leverage, Q, cash holdings, age, and size. We point out that equity volatility is the only variable in our empirical model in equation (6) that we regard as measure of an unobservable variable from the data generating process that we describe in equation (1). As we point out, it is necessary to use instrumental variable methods to obtain consistent estimates of the coefficients in our model because the error in measuring firm volatility with equity volatility, ε_2, is correlated with equity volatility and will produce biased and inconsistent estimates for any variable correlated with firm volatility.

However, one could argue that our measures of leverage, Q, cash holdings, age, and firm size are also noisy measures of the factors in equation (1). We suggest that while these controls do not perfectly measure the variables in our empirical model, we expect that the degree of error in measuring the underlying factors with these variables is not as severe, because they are direct estimates of the underlying factors. We do not expect that the wedge between the control variables we use in our analysis and the underlying factors in equation (1) is as significant as the wedge between firm and asset volatility. For example, the wedge between equity and firm volatility likely contains information on other factors such as stock market liquidity and all other determinants of equity volatility unrelated to firm volatility. We do not expect that the differences between leverage which we measure as total debt divided by the book value of assets and market leverage which is the book value debt divided by the market value of assets or that the difference between Q and expected future profitability is as substantial.

We also note that, our focus is on explaining the *difference* in U.S. and European loan spreads, and equity volatility, is the only factor that differs substantially between our U.S. and European subsamples. Since, we are concerned with obtaining consistent estimates of the difference in U.S. and European loan spreads, we argue that our primary concern should be focusing on accounting for error in measuring variables that we ex-ante expect are highly correlated with whether a firm is located in the U.S. or Europe, variables that we expect are important determinants of corporate loan spreads, and variables that are measured with substantial error. Furthermore, we note that, it is well known that it is difficult to instrument for several factors given the lack of precision in instrumental variable models, and therefore, it is important to focus on the variable that we expect to be the major confounding influence on our OLS estimates of the difference in U.S. and European loan spreads.

IV. Conclusion

This paper examines whether equity volatility, an error prone measure of firm volatility, can explain the difference in U.S. and European loan spreads. We suggest that equity volatility measures firm volatility because contingent claims models of debt and equity volatility predict that the value of corporate debt and equity volatility are both functions of firm volatility. We also argue that because equity volatility is not a perfect measure of firm volatility, controlling for firm volatility with equity volatility will result in biased and inconsistent estimates of the differences in U.S. and European loan spreads. We show that this is because the error in measuring firm volatility with equity volatility will result in biased and inconsistent coefficient estimates for any variable correlated with firm volatility. We use instrumental variable methods to remove the effect that error in measuring firm volatility has on our estimates, and find that after controlling for firm volatility with equity volatility, that there is no statistically significant difference in U.S. and European loan spreads.

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A. Appendix A

In this section we have a more general case of our econometric model. We show how using a proxy variable creates bias. Our derivations follow closely in Greene (2011), and we omit the constant term for simplicity. We define the two equations as follows:

$$r_i - r_f = \beta_1 \sigma_{Ai} + \beta_2 \frac{D_i}{A_i} + \beta_3 E_i + \beta_4 X_4 + \ldots + \beta_k X_k + \varepsilon_1 \quad (19)$$

$$\sigma_{Ei} = \alpha_1 \sigma_{Ai} + \alpha_2 \frac{D_i}{A_i} + \varepsilon_2 \quad (20)$$

and in a more compact matrix notation:

$$\mathbf{y} = \mathbf{X}^* \beta + \varepsilon_1 \qquad \varepsilon_1 \sim N[0, \sigma^2_{\varepsilon 1}]$$

$$\mathbf{X} = \mathbf{X}^* \alpha + \varepsilon_2 \qquad \varepsilon_2 \sim N[0, \sigma^2_{\varepsilon 2}]$$

where $\mathbf{y}$ is the loan spread, $\mathbf{X}^*$ is a $k \times k$ matrix of explanatory variables with $x_1^* = \sigma_{Ai}$ which is the unobserved variable. For expositional purposes we order the variables such that the first variable in the $\mathbf{X}$ matrix is σ_{Ai}, and the second variable is $x_2 = D_i/A_i$. Since we observe the proxy variable σ_{Ei}, we define $\mathbf{X}$ as a $k \times k$ matrix of explanatory variables with $x_1 = \sigma_{Ei}$.

We allow x_1 to be a function of leverage, D_i/A_i. It could also be a function of other explanatory variables, but just for mathematical convenience we are going to allow σ_{Ei} to be function of leverage only. If it was a function of other variables, then our results will hold under that scenario. The variance of ε_1 and ε_2 are $\sigma^2_{\varepsilon 1}$ and $\sigma^2_{\varepsilon 2}$ respectively.

Define: $X^* = \begin{bmatrix} x_{11}^* & x_{21} & x_{31} & \dots & x_{k1} \\ x_{12}^* & x_{22} & x_{32} & \dots & x_{k2} \\ . & . & . & & . \\ . & . & . & & . \\ x_{1n}^* & x_{2n} & x_{3n} & \dots & x_{kn} \end{bmatrix}_{n \times k}$,

$$\varepsilon_2 = \begin{bmatrix} \varepsilon_{21} & 0 & 0 & \dots & 0 \\ \varepsilon_{22} & 0 & 0 & & 0 \\ . & . & . & & . \\ . & . & . & & . \\ \varepsilon_{2n} & . & . & \dots & . \end{bmatrix}_{n \times k}, \ \alpha = \begin{bmatrix} \alpha_1 & 0 & 0 & \dots & 0 \\ \alpha_2 & 1 & 0 & & 0 \\ 0 & 0 & 1 & & 0 \\ . & . & . & \ddots & . \\ 0 & . & . & \dots & 1 \end{bmatrix}_{k \times k}$$

and $\Sigma_{\varepsilon 2} = \begin{bmatrix} \sigma_{\varepsilon 2}^2 & 0 & 0 & \dots & 0 \\ 0 & 0 & 0 & & 0 \\ . & . & . & & . \\ . & . & . & & . \\ . & . & . & \dots & . \end{bmatrix}_{k \times k}$

Given the set up we can write:

$$X = X^*\alpha + \varepsilon_2 = \begin{bmatrix} x_{11}^* & x_{21} & x_{31} & \dots & x_{k1} \\ x_{12}^* & x_{22} & x_{32} & \dots & x_{k2} \\ . & . & . & & . \\ . & . & . & & . \\ x_{1n}^* & x_{2n} & x_{3n} & \dots & x_{kn} \end{bmatrix}_{n\times k} \begin{bmatrix} \alpha_1 & 0 & 0 & \dots & 0 \\ \alpha_2 & 1 & 0 & & 0 \\ 0 & 0 & 1 & & 0 \\ . & . & . & & . \\ . & . & . & \dots & 1 \end{bmatrix}_{k\times k} + \begin{bmatrix} \varepsilon_{21} & 0 & 0 & \dots & 0 \\ \varepsilon_{22} & 0 & 0 & & 0 \\ . & . & . & & . \\ . & . & . & & . \\ \varepsilon_{22} & . & . & \dots & . \end{bmatrix}_{n\times k}$$

$$= \begin{bmatrix} \alpha_1 x_{11}^* + \alpha_2 x_{21} + \varepsilon_{21} & x_{21} & x_{31} & \dots & x_{k1} \\ \alpha_1 x_{12}^* + \alpha_2 x_{22} + \varepsilon_{22} & x_{22} & x_{32} & \dots & x_{k2} \\ . & . & . & & . \\ . & . & . & & . \\ \alpha_1 x_{1n}^* + \alpha_2 x_{2n} + \varepsilon_{2n} & x_{2n} & x_{3n} & \dots & x_{kn} \end{bmatrix}_{n\times k}.$$

$$\begin{aligned} \beta &= (X'X)^{-1}X'Y && (21) \\ &= [(X^*\alpha + \varepsilon_2)'(X^*\alpha + \varepsilon_2)]^{-1}(X^*\alpha + \varepsilon_2)'(X^*\beta + \varepsilon_1) \\ \beta &= [\alpha' X^{*\prime} X^* \alpha + \alpha' X^{*\prime} \varepsilon_2 + \varepsilon_2' X^{*\prime} \alpha' + \varepsilon_2' \varepsilon_2]^{-1}(\alpha' X^{*\prime} X^* \beta + \alpha' X^{*\prime} \varepsilon_1 + \varepsilon_2' X^* \beta + \varepsilon_2' \varepsilon_1) \\ \text{plim}\hat{\beta} &= [\alpha' Q^* \alpha + \Sigma_{\varepsilon 2}]^{-1} \alpha' Q^{*\prime} \beta && (22) \end{aligned}$$

where $\text{plim}\frac{X^{*\prime}X^*}{n} = Q^*$. Examining the inverse matrix:

$$\begin{aligned} [\alpha' Q^* \alpha + \Sigma_{\varepsilon 2}]^{-1} &= [\alpha' Q^* \alpha + (\sigma_{\varepsilon 2} e_1)(\sigma_{\varepsilon 2} e_1)']^{-1} \\ &= (\alpha' Q^* \alpha)^{-1} - \frac{(\alpha' Q^* \alpha)^{-1} \Sigma_{\varepsilon 2} (\alpha' Q^* \alpha)^{-1}}{1 + (\sigma_{\varepsilon 2} e_1)' (\alpha' Q^* \alpha)^{-1} (\sigma_{\varepsilon 2} e_1)} \end{aligned}$$

where e_1 is the first column of a $k \times k$ identity matrix. Then Equation (22) can be expanded as:

$$\text{plim}\hat{\beta} = \left(\alpha' Q^* \alpha\right)^{-1} \alpha' Q^{*\prime} \beta - \frac{\left(\alpha' Q^* \alpha\right)^{-1} \Sigma_{\varepsilon 2} \left(\alpha' Q^* \alpha\right)^{-1}}{1 + \left(\sigma_{\varepsilon 2} e_1\right)' \left(\alpha' Q^* \alpha\right)^{-1} \left(\sigma_{\varepsilon 2} e_1\right)} \alpha' Q^{*\prime} \beta \qquad (23)$$

$$= \alpha^{-1} Q^{*-1} \alpha'^{-1} \alpha' Q^{*\prime} \beta - \frac{\alpha^{-1} Q^{*-1} \alpha'^{-1} \Sigma_{\varepsilon 2} \alpha^{-1} Q^{*-1} \alpha'^{-1} \alpha' Q^{*\prime} \beta}{1 + (\sigma_{\varepsilon 2} e_1)' \alpha^{-1} Q^{*-1} \alpha'^{-1} (\sigma_{\varepsilon 2} e_1)} \qquad (24)$$

$$= \alpha^{-1} \beta - \frac{\alpha^{-1} Q^{*-1} \alpha'^{-1} \Sigma_{\varepsilon 2} \alpha^{-1} \beta}{1 + (\sigma_{\varepsilon 2} e_1)' \alpha^{-1} Q^{*-1} \alpha'^{-1} (\sigma_{\varepsilon 2} e_1)} \qquad (25)$$

Define:

$$Q^{*-1} = \begin{bmatrix} q^{*11} & q^{*12} & q^{*13} & \ldots & q^{*1k} \\ q^{*21} & q^{*22} & q^{*23} & \ldots & q^{*2k} \\ . & . & . & & . \\ . & . & . & & . \\ q^{*k1} & q^{*k2} & q^{*k3} & \ldots & q^{*kk} \end{bmatrix}$$

Also we can calculate the following expressions:

$$\alpha^{-1} = \begin{bmatrix} {}^{1}/_{\alpha_1} & 0 & 0 & \dots & 0 \\ {}^{-\alpha_2}/_{\alpha_1} & 1 & 0 & & 0 \\ 0 & 0 & 1 & & 0 \\ . & . & . & \ddots & . \\ . & . & . & \dots & 1 \end{bmatrix}$$

$$\alpha^{-1}\beta = \begin{bmatrix} {}^{1}/_{\alpha_1} & 0 & 0 & \dots & 0 \\ {}^{-\alpha_2}/_{\alpha_1} & 1 & 0 & & 0 \\ 0 & 0 & 1 & & 0 \\ . & . & . & \ddots & . \\ . & . & . & \dots & 1 \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \\ . \\ \beta_k \end{bmatrix} = \begin{bmatrix} \frac{\beta_1}{\alpha_1} \\ \beta_2 - \beta_1 \frac{\alpha_2}{\alpha_1} \\ \beta_3 \\ . \\ \beta_k \end{bmatrix}$$

$$\alpha^{-1}Q^{*-1}\alpha'^{-1} \quad = \quad \begin{bmatrix} {}^{1}/_{\alpha_1} & 0 & 0 & \dots & 0 \\ {}^{-\alpha_2}/_{\alpha_1} & 1 & 0 & & 0 \\ 0 & 0 & 1 & & 0 \\ . & . & . & \ddots & . \\ . & . & . & \dots & 1 \end{bmatrix} \begin{bmatrix} q^{*11} & q^{*12} & q^{*13} & \dots & q^{*1k} \\ q^{*21} & q^{*22} & q^{*23} & \dots & q^{*2k} \\ . & . & . & & . \\ . & . & . & & . \\ q^{*k1} & q^{*k2} & q^{*k3} & \dots & q^{*kk} \end{bmatrix} \begin{bmatrix} {}^{1}/_{\alpha_1} & {}^{-\alpha_2}/_{\alpha_1} & 0 & \dots & 0 \\ 0 & 1 & 0 & & 0 \\ 0 & 0 & 1 & & 0 \\ . & . & . & \ddots & . \\ . & . & . & \dots & 1 \end{bmatrix}$$

$$= \begin{bmatrix} \frac{q^{*11}}{\alpha_1^2} & -\frac{\alpha_2 q^{*11}}{\alpha_1^2} + \frac{q^{*12}}{\alpha_1} & q^{*13} & . & q^{*1k} \\ -\frac{\alpha_2 q^{*11}}{\alpha_1^2} + \frac{q^{*21}}{\alpha_1} & -\frac{\alpha_2^2 q^{*11}}{\alpha_1^2} - \frac{\alpha_2(q^{*12} + q^{*21})}{\alpha_1} + q^{*22} & -\frac{\alpha_2 q^{*13}}{\alpha_1^2} + q^{*23} & . & -\frac{\alpha_2 q^{*1k}}{\alpha_1^2} + q^{*2k} \\ \frac{q^{*31}}{\alpha_1} & -\frac{\alpha_2 q^{*31}}{\alpha_1^2} + q^{*32} & . & & . \\ . & . & . & & . \\ \frac{q^{*k1}}{\alpha_1} & -\frac{\alpha_2 q^{*k1}}{\alpha_1^2} + q^{*k2} & q^{*k3} & . & q^{*kk} \end{bmatrix}$$

$$\alpha^{-1} Q^{*-1} \alpha'^{-1} \Sigma_{\varepsilon 2} \alpha^{-1} \beta = \begin{bmatrix} \frac{\beta_1}{\alpha_1} \sigma_{\varepsilon 2}^2 \frac{q^{*11}}{\alpha_1^2} \\ \\ \frac{\beta_1}{\alpha_1} \sigma_{\varepsilon 2}^2 \left(\frac{q^{*21}}{\alpha_1} - \frac{\alpha_2 q^{*11}}{\alpha_1^2} \right) \\ \\ \frac{\beta_1}{\alpha_1} \sigma_{\varepsilon 2}^2 \frac{q^{*31}}{\alpha_1} \\ \\ . \\ . \\ . \\ \frac{\beta_1}{\alpha_1} \sigma_{\varepsilon 2}^2 \frac{q^{*k1}}{\alpha_1} \end{bmatrix}$$

$$(\sigma_{\varepsilon 2} e_1)' \alpha^{-1} Q^{*-1} \alpha'^{-1} (\sigma_{\varepsilon 2} e_1) = \begin{bmatrix} \sigma_{\varepsilon 2} & 0 & 0 & \ldots & 0 \end{bmatrix} \alpha^{-1} Q^{*-1} \alpha'^{-1} \begin{bmatrix} \sigma_{\varepsilon 2} \\ 0 \\ 0 \\ . \\ 0 \end{bmatrix}$$

$$= \sigma_{\varepsilon 2} \frac{q^{*11}}{\alpha_1^2}$$

Then Equation (25) can be written as:

$$\text{plim} \begin{bmatrix} \widehat{\frac{\beta_1}{\alpha_1}} \\ \widehat{\beta_2 - \beta_1 \frac{\alpha_2}{\alpha_1}} \\ \hat{\beta}_3 \\ . \\ . \\ . \\ \hat{\beta}_k \end{bmatrix} = \begin{bmatrix} \frac{\beta_1}{\alpha_1} \\ \beta_2 - \beta_1 \frac{\alpha_2}{\alpha_1} \\ \beta_3 \\ . \\ . \\ . \\ \beta_k \end{bmatrix} - \begin{bmatrix} \frac{\beta_1}{\alpha_1} \sigma_{\varepsilon 2}^2 \frac{q^{*11}}{\alpha_1^2} / \left(1 + \sigma_{\varepsilon 2} \frac{q^{*11}}{\alpha_1^2}\right) \\ \frac{\beta_1}{\alpha_1} \sigma_{\varepsilon 2}^2 (\frac{q^{*21}}{\alpha_1} - \frac{\alpha_2 q^{*11}}{\alpha_1^2}) / \left(1 + \sigma_{\varepsilon 2} \frac{q^{*11}}{\alpha_1^2}\right) \\ \frac{\beta_1}{\alpha_1} \sigma_{\varepsilon 2}^2 \frac{q^{*31}}{\alpha_1} / \left(1 + \sigma_{\varepsilon 2} \frac{q^{*11}}{\alpha_1^2}\right) \\ . \\ . \\ \frac{\beta_1}{\alpha_1} \sigma_{\varepsilon 2}^2 \frac{q^{*k1}}{\alpha_1} / \left(1 + \sigma_{\varepsilon 2} \frac{q^{*11}}{\alpha_1^2}\right) \end{bmatrix}$$

The expression for the variable that we use proxy for:

$$\text{plim} \widehat{\frac{\beta_1}{\alpha_1}} = \frac{\beta_1/\alpha_1}{1 + \sigma_{\varepsilon 2}^2 \frac{q^{*11}}{\alpha_1^2}} = \frac{\beta_1}{\alpha_1} \frac{\alpha_1^2 (q^{*11})^{-1}}{\alpha_1^2 (q^{*11})^{-1} + \sigma_{\varepsilon 2}^2} \tag{26}$$

and for the explanatory variable that is in both equations (leverage, D_i/A_i) the coefficient estimate becomes:

$$\begin{aligned}
\text{plim}\widehat{\beta_2 - \beta_1 \frac{\alpha_2}{\alpha_1}} &= \left(\beta_2 - \beta_1 \frac{\alpha_2}{\alpha_1}\right) - \frac{\frac{\beta_1}{\alpha_1}\sigma_{\varepsilon 2}^2 \left[\frac{q^{*21}}{\alpha_1} - \frac{\alpha_2 q^{*11}}{\alpha_1^2}\right]}{1 + \sigma_{\varepsilon 2}^2 \frac{q^{*11}}{\alpha_1^2}} \\
&= \left(\beta_2 - \beta_1 \frac{\alpha_2}{\alpha_1}\right) - \text{plim}\left(\widehat{\frac{\beta_1}{\alpha_1}}\right) \sigma_{\varepsilon 2}^2 \left[\frac{q^{*21}}{\alpha_1} - \frac{\alpha_2 q^{*11}}{\alpha_1^2}\right] \\
&= \left(\beta_2 - \beta_1 \frac{\alpha_2}{\alpha_1}\right) - \text{plim}\left(\widehat{\frac{\beta_1}{\alpha_1}}\right) \sigma_{\varepsilon 2}^2 \frac{q^{*21}}{\alpha_1} + \text{plim}\left(\widehat{\frac{\beta_1}{\alpha_1}}\right) \sigma_{\varepsilon 2}^2 \frac{\alpha_2 q^{*11}}{\alpha_1^2} \qquad (27) \\
&= \left(\beta_2 - \beta_1 \frac{\alpha_2}{\alpha_1}\right) + \beta_1 \left[\phi_{\sigma_A, x_2} + \frac{\alpha_2}{\alpha_1}\right] \frac{\sigma_{\varepsilon_2}^2}{\alpha_1^2 \left(q^{*11}\right)^{-1} + \sigma_{\varepsilon_2}^2} \qquad (28)
\end{aligned}$$

where $\phi_{\sigma_A, x_2} = -{q^{*21}}/{q^{*11}}$ is the coefficient on x_2 in a regression of σ_A on $(x_2, \ldots, x_k)$.

For the rest of the explanatory variables we have:

$$\begin{aligned}
\text{plim}\hat{\beta}_j &= \beta_j - \text{plim}\left(\widehat{\frac{\beta_1}{\alpha_1}}\right) \sigma_{\varepsilon 2}^2 \frac{q^{*j1}}{\alpha_1} \qquad (29) \\
&= \beta_j + \beta_1\, \phi_{\sigma_A, x_j}\, \frac{\sigma_{\varepsilon_2}^2}{\alpha_1^2 \left(q^{*11}\right)^{-1} + \sigma_{\varepsilon_2}^2} \qquad \text{for} j = 3, 5 \ldots, k \qquad (30)
\end{aligned}$$

where $\phi_{\sigma_A, x_j} = -{q^{*j1}}/{q^{*11}}$ is the coefficient on x_j in a regression of σ_A on $(x_2, \ldots, x_k)$.

Table I: **Borrower Region and Market of Syndication**

This table tabulates borrowers' location against loans' market of syndication. "Other" market of syndication includes Africa, Asia Pacific, Eastern Europe/Russia, Latin America/Caribbean, and Unknown.

	Market of Syndication			
Borrower Region	United States	Western Europe	Other	Total
United States	14776	45	9	14820
Western Europe	45	1712	14	1771
Total	14811	1757	23	16591

Table II: **Summary Statistics by Country for Loan-Level Characteristics**

This table reports mean values of loan-level characteristics at the country level in our primary data set. N is the number of observations for each country.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	N	Spread	Total Vol.	Amihud	P-Zero	Cash & STI Vol.	Book Eq. Vol.	Leverage	Cash	Age	Average Q	Size	Amount
Austria	5	117.500	23.745	0.068	0.009	3.417	5.676	0.293	0.071	2.528	1.203	7.891	19.454
Belgium	19	145.790	35.601	0.031	0.004	3.291	5.127	0.256	0.054	2.469	1.219	8.404	20.056
Cyprus	1	95.000	31.745	0.001	0.000	10.060	10.801	0.515	0.062	2.565	7.116	6.051	20.819
Denmark	22	214.068	25.944	0.016	0.036	6.587	11.137	0.386	0.109	2.742	1.543	8.273	20.095
Finland	37	81.622	33.729	0.439	0.021	4.163	5.939	0.280	0.054	2.622	1.148	8.419	20.232
France	293	122.379	33.588	0.716	0.024	6.705	9.121	0.282	0.108	2.479	1.724	8.232	19.663
Germany	193	137.150	36.073	0.258	0.013	5.331	8.052	0.274	0.075	2.669	1.297	9.128	20.431
Greece	11	82.045	32.102	0.050	0.028	7.566	9.609	0.250	0.118	1.811	1.428	7.228	18.611
Ireland	30	232.350	42.463	0.244	0.065	6.367	6.533	0.369	0.124	2.051	1.434	7.941	19.342
Italy	122	167.526	33.319	0.136	0.008	7.198	9.401	0.320	0.096	2.296	1.301	8.342	19.204
Luxembourg	5	92.000	39.132	2.768	0.010	11.163	10.296	0.349	0.036	2.463	1.472	9.234	20.592
Netherlands	130	204.073	36.229	1.200	0.019	6.946	8.964	0.287	0.088	2.444	1.462	7.582	19.272
Norway	39	151.795	36.145	1.384	0.051	5.052	9.006	0.365	0.083	2.368	1.830	6.665	19.634
Portugal	8	102.250	28.097	0.023	0.014	3.149	8.697	0.299	0.028	1.955	1.434	8.392	19.816
Spain	158	119.468	29.586	0.180	0.019	4.584	7.040	0.374	0.068	2.525	1.380	8.998	20.032
Sweden	69	128.949	29.824	1.761	0.056	5.956	7.241	0.259	0.101	2.327	1.390	4.929	19.738
Switzerland	48	93.760	33.780	0.131	0.028	5.918	9.327	0.261	0.098	2.285	1.902	8.334	20.093
United Kingdom	581	180.320	39.129	0.693	0.034	5.619	12.579	0.295	0.079	2.454	1.740	7.787	19.486
Europe	1771	153.917	35.442	0.612	0.027	5.872	9.758	0.300	0.086	2.459	1.571	8.048	19.688
USA	14820	198.397	49.028	0.885	0.028	6.402	11.056	0.300	0.086	2.485	1.718	6.831	18.604
Total	16591	193.649	47.578	41.284	27.721	6.345	10.918	0.300	0.086	2.482	1.702	6.961	18.720

Table III: **Summary Statistics by Country for Country-Level Characteristics**

This table reports the mean values for country level characteristics in our primary data set.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Investor Protection	Anti Self Dealing	Creditor Rights	Common Law	Market Cap.	Stocks Traded over GDP	Private Bond	R&D
Austria	1.034	0.21	3	0.000	22.874	7.356	35.340	2.244
Belgium	0.478	0.54	2	0.000	58.989	25.976	42.627	1.892
Cyprus	.	.	.	.	134.964	24.441	7.721	.
Denmark	4.444	0.46	3	0.000	65.131	50.044	135.615	2.561
Finland	4.886	0.46	1	0.000	116.868	133.487	23.308	3.493
France	4.238	0.38	0	0.000	86.661	84.625	41.036	2.133
Germany	0.102	0.28	3	0.000	46.484	65.757	40.867	2.544
Greece	2.443	0.22	1	0.000	60.907	31.537	1.038	0.574
Ireland	6.204	0.79	1	1.000	54.661	31.234	48.988	1.247
Italy	1.705	0.42	2	0.000	45.046	63.188	38.560	1.151
Luxembourg	.	0.28	.	.	195.521	3.146	.	1.620
Netherlands	4.921	0.20	3	0.000	102.131	157.840	61.534	1.864
Norway	5.545	0.42	2	0.000	51.463	51.762	22.868	1.599
Portugal	4.602	0.44	1	0.000	44.817	38.147	24.844	0.988
Spain	6.011	0.37	2	0.000	88.456	136.207	37.200	1.177
Sweden	4.045	0.33	1	0.000	105.412	112.664	41.226	3.664
Switzerland	3.580	0.27	1	0.000	263.891	254.395	34.568	2.866
United Kingdom	8.272	0.95	4	1.000	138.245	177.476	16.440	1.776
Europe	5.142	0.55	2.410	0.346	101.724	124.535	33.952	1.933
USA	10	0.65	1	1.000	138.308	219.633	100.043	2.637
Total	9.483	0.64	1.150	0.930	134.403	209.482	93.006	2.563

Table IV: **Matched Sample Tests**

This table reports mean, median, and standard deviation values for matched US and European loan-level and country-level characteristics. The first part reports values for the variables used in the propensity matching procedure where P-score is the propensity score. The second part reports the values for the country-level characteristics. The last part reports the values for the credit rating dummies. We don't report standard deviation for country-level variables that do not change over time. For the loan-level characteristics, p-values from the t-test for the mean differences and from the Wilcoxon test for differences in medians are reported in the last two columns.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	US			Europe			Differences		Tests	
Variable	Mean	Median	St. Dev.	Mean	Median	St. Dev.	Means	Medians	t-Test	Wilcoxon
P-score	0.251	0.218	0.173	0.251	0.218	0.172	0.000	0.000	0.000	0.000
Spread	186.268	150.000	152.527	155.731	100.000	163.344	30.536	50.000	0.000	0.000
Total Vol.	44.503	37.496	23.019	35.275	33.225	12.797	9.228	4.271	0.000	0.000
Idio. Vol.	37.336	31.102	21.814	29.527	27.103	12.739	7.810	3.999	0.000	0.000
Syst. Vol.	28.415	22.379	20.285	23.692	19.805	14.190	4.724	2.574	0.000	0.000
Cash & STI Vol.	6.157	3.641	7.525	5.965	3.608	6.909	0.192	0.033	0.437	0.110
Book Equity Vol.	11.007	6.556	12.842	9.995	5.738	12.638	1.011	0.819	0.023	0.000
Leverage	0.305	0.283	0.206	0.297	0.284	0.169	0.008	-0.001	0.261	0.306
Cash	0.087	0.040	0.116	0.086	0.063	0.086	0.001	-0.023	0.873	0.000
Age	2.466	2.565	0.494	2.476	2.565	0.463	-0.010	0.000	0.566	0.371
Average Q	1.612	1.397	0.798	1.604	1.289	1.069	0.008	0.108	0.804	0.002
Size	7.837	7.726	1.730	7.864	7.759	1.817	-0.026	-0.033	0.642	0.148
Amount	19.569	19.599	1.354	19.579	19.669	1.461	-0.010	-0.070	0.825	0.147
Country Characteristics										
Investor Prot.	10	10		5.158	4.921	2.719	4.842	5.079		
Anti-Self Dealing	0.65	0.65		0.550	0.380	0.293	0.100	0.27		
Common Law	1	1		0.346	0	0.476	0.654	1		
Private Bond	105.593	103.877	7.934	34.075	34.847	20.506	71.518	69.030		
Market Cap/GDP	132.643	136.968	19.521	102.444	92.108	50.887	30.199	44.860		
Stocks/GDP	242.308	239.573	83.497	123.039	111.039	76.509	119.269	128.535		
Stock Turnover	189.129	182.806	77.858	125.741	121.082	52.405	63.388	61.723		
R&D	2.640	2.620	0.076	1.945	1.810	0.605	0.695	0.810		
Credit Rating										
AAA	0	0	0	0	0	0	0.000	0.000		
Aa	0.004	0	0.066	0.006	0	0.157	-0.002	0.000		
A	0.063	0	0.243	0.070	0	0.510	-0.007	0.000		
Baa	0.074	0	0.262	0.073	0	0.520	0.001	0.000		
Ba	0.036	0	0.187	0.034	0	0.361	0.002	0.000		
B	0.025	0	0.156	0.026	0	0.319	-0.001	0.000		
Caa	0.010	0	0.099	0.007	0	0.165	0.003	0.000		
Ca	0	0	0	0	0	0	0.000	0.000		
C	0	0	0	0	0	0	0.000	0.000		

Table V: **Main OLS Results**

The dependent variable in OLS regressions is the all-in-drawn spread on the loan. The top panel, *Panel A*, uses the borrower country specification and the bottom panel, *Panel B*, uses the market of syndication to define the European sample. First two columns do not include total volatility as an explanatory variable, and the last two columns do include. Debt rating, loan type, loan purpose, 2-digit SIC, and year dummies are included in the regressions but are omitted from the table. All standard errors are clustered at the firm level and are reported below the coefficient estimates.

	(1)	(2)	(3)	(4)
	without Volatility		with Volatility	
Panel A: Borrower Country	Full	Matched	Full	Matched
European C.	-56.28***	-62.86***	-46.87***	-50.34***
	4.78	5.87	4.62	5.69
Total Vol.			1.12***	1.47***
			0.07	0.17
Leverage	112.09***	120.30***	102.25***	111.84***
	9.07	18.54	8.71	17.33
Cash	76.36***	99.79***	56.61***	77.19**
	13.69	34.79	13.60	34.90
Age	-21.84***	-16.27**	-20.63***	-17.03***
	3.88	6.53	3.78	6.51
Average Q	-14.85***	-12.32***	-14.41***	-11.97***
	1.42	2.94	1.38	2.89
Size	-10.61***	-10.78***	-8.89***	-10.02***
	1.42	2.33	1.40	2.37
Amount	-19.91***	-15.14***	-18.07***	-12.39***
	1.36	2.88	1.34	2.85
R^2	0.241	0.156	0.266	0.186
N	16591	3210	16591	3210
N-US	14820	1605	14820	1605
N-EU	1771	1605	1771	1605
Panel B: Borrower Market				
European M.	-58.81***	-71.35***	-49.67***	-57.35***
	4.66	6.05	4.49	6.06
Total Vol.			1.11***	1.47***
			0.07	0.17
R^2	0.243	0.167	0.268	0.198
N	16582	3170	16582	3170

* p<.10, ** p<.05, *** p<.01

Table VI: **Main IV Results**

The dependent variable in IV regressions is the all-in-drawn spread on the loan. The top panel, *Panel A*, uses the borrower country specification and the bottom panel, *Panel B*, uses the market of syndication to define the European sample. First two columns report the results for the first stage estimation, and the last two columns report the results for the second stage estimation. Debt rating, loan type, loan purpose, 2-digit SIC, and year dummies are included in the regressions but are omitted from the table. All standard errors are clustered at the firm level and are reported below the coefficient estimates.

	(1)	(2)	(3)	(4)
	1^{st} Stage		2^{nd} Stage	
Panel A: Borrower Country	Full	Matched	Full	Matched
European C.	-8.43***	-8.38***	-5.48	1.58
	0.63	0.83	8.65	15.25
Total Vol.			6.02***	7.59***
			0.84	1.74
Cash & STI Vol.	0.09**	0.08		
	0.04	0.08		
Book Equity Vol.	0.16***	0.16***		
	0.02	0.04		
Leverage	7.43***	5.00	58.46***	75.31***
	1.62	3.37	12.38	25.92
Cash	12.76***	10.88**	-31.14	-17.25
	2.37	4.42	22.10	44.19
Age	0.22	1.67*	-15.14***	-19.96**
	0.66	0.91	4.79	8.78
Average Q	-0.79***	-0.84*	-12.49***	-10.71***
	0.24	0.44	1.77	3.58
Size	-1.29***	-0.41	-1.32	-7.13**
	0.23	0.31	2.17	3.33
Amount	-1.70***	-1.86***	-9.94***	-0.96
	0.21	0.34	2.18	4.86
Signal/Noise			0 .519	0.440
N	16591	3210	16591	3210
N-US	14820	1605	14820	1605
N-EU	1771	1605	1771	1605
Under-Id			0.000	0.000
Hansen J			0.580	0.416
Endog			0.000	0.000
Panel B: Borrower Market				
European M.	-8.25***	-9.49***	-9.64	-15.45
	0.63	0.81	8.33	13.89
Total Vol.			5.98***	5.82***
			0.83	1.39
Cash & STI Vol.	0.10**	-0.01		
	0.04	0.07		
Book Equity Vol.	0.17***	0.21***		
	0.02	0.04		
Signal/Noise			0.519	0.405
Observations	16582	3170	16582	3170

* p<.10, ** p<.05, *** p<.01

Table VII: **Simple Regression Analysis with the Matched Sample**

This table reports estimations for univariate or bivariate regressions where the dependent variable is the spread difference between US and Europe. In columns (1) and (3) the results for the regression on a constant are reported. In columns (2) and (4) the results for the regression on a constant and the volatility difference between US and Europe are reported. The first two columns use yearly data from our full data sample, where as the last two columns use yearly data from our matched data sample. Panel 1 reports the results for the whole time period 1998-2011 sample, and Panel B reports the results for the years 2000-2011.

	(1)	(2)	(3)	(4)
	Full Sample		Matched Sample	
Panel A: Years 1998-2011				
Constant	-66.51	56.91 ***	44.81***	2.27
	12.25	23.33	12.23	22.12
Total Vol. Difference		9.73***		4.30**
		2.05		1.51 0
R^2	0.000	.555	0.000	0.240
N	14	14	14	14
Panel B: Years 2000-2011				
Constant	-53.24***	40.80***	34.15**	-22.81*
	9.72	18.808	11.57	11.65
Total Vol. Difference	7.72***			5.51***
	1.64			1.06
R^2	0.000	.603	0.000	0.677
N	12	12	12	12

* p<.10, ** p<.05, *** p<.01

Table VIII: **Results for Estimations that use Cross Country Characteristics**

The dependent variable used in the regressions is the all-in-drawn spread on the loan. The variable name under the column number refers to the country characteristics used in the regression. In column (4) we include *Anti-Self Dealing* and *Creditor Rights* variables in the regression, and the *Legal Var.* reports the coefficient estimate for the *Anti-Self Dealing* variable. The top panel, *Panel A*, uses the full sample for estimations, and the bottom panel, *Panel B*, uses the matched sample. In both panels, the first sub-panel is for the reduced form, the second sub-panel is for the first stage, and the last sub-panel is for the second stage results. Leverage, cash, age, average q, size, loan amount variables, and debt rating, loan type, loan purpose, 2-digit SIC, and year dummies are included in the regressions but are omitted from the table. All standard errors are clustered at the firm level and are reported below the coefficient estimates.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Investor Protection	Anti Self Dealing	Creditor Rights	(2) & (3)	Common Law	Market Cap.	Stocks Traded over GDP	Private Bond	R&D
					Panel A: **Full Sample Results**				
Reduced Form									
Legal Var.	8.80***	72.29***	-8.11***	99.64***	59.44***	0.52***	0.31***	0.69***	38.69***
	0.91	13.73	2.11	14.90	5.49	0.09	0.03	0.06	5.06
Creditor Rights				-13.44***					
				2.31					
R^2	0.249	0.240	0.238	0.244	0.249	0.241	0.248	0.249	0.252
First Stage									
Legal Var.	1.19***	8.66***	-1.87***	13.97***	8.23***	0.06***	0.05***	0.10***	4.87***
	0.12	1.72	0.26	1.94	0.71	0.01	0.00	0.01	0.70
Creditor Rights				-2.62***					
				0.30					
R^2	0.126	0.119	0.121	0.125	0.127	0.119	0.128	0.129	0.125
Second Stage									
Total Vol.	6.02***	5.99***	5.98***	5.98***	6.01***	5.99***	6.02***	6.02***	6.63***
	0.85	0.85	0.83	0.84	0.86	0.84	0.84	0.84	1.00
Legal Var.	1.65	20.39	3.17	15.93	9.94	0.19**	0.03	0.08	6.03
	1.33	15.83	2.51	18.86	9.46	0.09	0.05	0.11	7.29
Creditor Rights				2.31					
				3.01					
N	16585	16590	16585	16585	16585	16591	16591	16586	15277
N-US	14820	14820	14820	14820	14820	14820	14820	14820	13,657
N-EU	1765	1770	1765	1765	1765	1771	1771	1765	1620
Under-Id	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen J	0.545	0.543	0.561	0.538	0.543	0.540	0.566	0.573	0.457
Endog	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
					Panel B: **Matched Sample Results**				
Reduced Form									
Legal Var.	8.89***	65.07***	-1.60	84.80***	57.06***	0.47***	0.34***	0.68***	26.99***
	0.99	13.41	2.24	15.31	6.16	0.10	0.03	0.08	5.49
Creditor Rights				-7.92***					
				2.53					
R^2	0.163	0.138	0.128	0.142	0.162	0.143	0.170	0.159	0.133
First Stage									
Legal Var.	1.03***	6.85***	-1.02***	11.64***	7.08***	0.04***	0.04***	0.09***	3.43***
	0.14	1.59	0.29	1.98	0.78	0.01	0.00	0.01	0.68
Creditor Rights				-1.89***					
				0.34					
R^2	0.087	0.063	0.061	0.079	0.090	0.062	0.102	0.089	0.073
Second Stage									
Total Vol.	7.60***	7.51***	7.33***	7.45***	7.64***	7.45***	7.61***	7.54***	8.31***
	1.76	1.73	1.64	1.71	1.82	1.70	1.78	1.69	1.93
Legal Var.	0.98	13.40	6.15**	-2.87	2.86	0.19*	0.00	0.02	-1.68
	2.03	19.13	2.92	25.99	14.51	0.11	0.09	0.17	8.78
Creditor Rights				6.47					
				4.17					
N	3206	3209	3206	3206	3206	3210	3210	3207	2866
N-US	1605	1605	1605	1605	1605	1605	1605	1605	1398
N-EU	1601	1604	1601	1601	1601	1605	1605	1602	1468
Under-Id	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen J	0.385	0.394	0.369	0.377	0.400	0.372	0.436	0.414	0.257
Endog	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

* p<.10, ** p<.05, *** p<.01

Table IX: **Results for Estimations that use Liquidity Measures**

The dependent variable in the regressions is the all-in-drawn spread on the loan. The top panel, *Panel A* reports the results for the main sample where pzero is used a regressor to control for liquidity; the bottom panel, *Panel B* reports the results for the sample where pzero is equal to zero; the bottom panel, *Panel C* reports the results where mean trading volume is used a regressor to control for liquidity. The first two columns report the results for the first stage and the last two columns report the results for second stage estimations. Debt rating, loan type, loan purpose, 2-digit SIC, and year dummies are included in the regressions but are omitted from the table. All standard errors are clustered at the firm level and are reported below the coefficient estimates.

	(1)	(2)	(3)	(4)
	1^{st} Stage		2^{nd} Stage	
	Full	Matched	Full	Matched
Panel A: Main Sample				
European C.	-8.12***	-7.91***	-10.02	-3.29
	0.64	0.88	8.27	14.39
Total Vol.			5.91***	7.43***
			0.83	1.68
P-Zero Ret.	-16.60**	-26.32**	196.75***	215.03*
	6.56	11.92	49.70	114.76
R^2	0.132	0.108		
N	16591	3210	16591	3210
N-US	14820	1605	14820	1605
N-EU	1771	1605	1771	1605
Under-Id			0.000	0.000
Hansen J			0.491	0.446
Endog			0.000	0.000
Panel B: PZero=0				
European C.	-7.24***	-7.88***	-4.32	3.15
	0.81	1.05	10.67	19.37
Total Vol.			7.09***	7.72***
			1.15	2.21
R^2	0.116	0.089		
N	8450	1927	8450	1927
N-US	7541	1130	7541	1130
N-EU	909	797	909	797
Under-Id			0.000	0.001
Hansen J			0.491	0.624
Endog			0.000	0.000
Panel C: Mean Trading Volume				
European C.	-8.97***	-8.52***	-2.79	4.08
	0.63	0.85	9.01	15.62
Total Vol.			6.07***	7.65***
			0.84	1.75
Amihud Volume	0.65***	0.36*	-2.71***	-4.13**
	0.07	0.21	0.73	1.68
R^2	0.144	0.107		
N	16582	3208	16582	3208
N-US	14811	1603	14811	1603
N-EU	1771	1605	1771	1605
Under-Id			0.000	0.000
Hansen J			0.801	0.525
Endog			0.000	0.000

* p<.10, ** p<.05, *** p<.01

Table X: **Results for the Estimations that use Dollar Denominated Loan Spreads**

The Dollar Sample includes the loans that are denominated in U.S. dollars. The results for the estimation that uses the dollar sample are reported in columns (1)-(4), and the dependent variable is the all-in-drawn spread on the loan. The Dollar and Dollar Converted Sample includes all Dollar denominated loan spreads and all Euro and Pound denominated loans that we convert to Dollars. The Dollar and Dollar Converted Sample results are reported in columns (5)-(8). At the bottom of the table we report the first stage coefficient estimate on the European dummy. Debt rating, loan type, loan purpose, 2-digit SIC, and year dummies are included in the regressions but are omitted from the table. All standard errors are clustered at the firm level and are reported below the coefficient estimates.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dollar Sample				Dollar and Dollar Converted Sample			
	OLS		IV		OLS		IV	
	Full	Matched	Full	Matched	Full	Matched	Full	Matched
European C	-36.76***	-40.92***	-8.03	-13.98	-43.89***	-42.24***	-10.23	-1.88
	8.88	9.50	10.62	14.30	5.37	6.37	8.13	13.64
Total Vol.	1.05***	1.23***	5.36***	5.36***	1.09***	1.41***	5.62***	6.91***
	0.07	0.17	0.81	1.58	0.07	0.17	0.81	1.67
Leverage	101.51***	98.80***	62.49***	69.43**	102.72***	115.13***	61.77***	73.43***
	9.13	21.60	12.57	28.82	8.92	19.66	12.45	28.09
Cash	57.60***	85.95**	-19.51	6.58	56.76***	69.15**	-24.19	-25.04
	13.74	37.46	21.39	47.81	13.52	34.70	21.30	44.48
Age	-20.49***	-17.17**	-16.00***	-21.97**	-20.04***	-16.58**	-15.74***	-21.70**
	4.01	7.28	4.94	9.37	3.89	6.67	4.83	9.09
Average Q	-15.35***	-16.27***	-14.07***	-17.12***	-15.18***	-13.41***	-13.77***	-13.66***
	1.36	3.29	1.67	3.75	1.36	3.06	1.68	3.64
Size	-8.90***	-12.91***	-1.71	-10.13***	-9.05***	-11.76***	-1.73	-7.73**
	1.53	3.13	2.26	3.84	1.47	2.62	2.21	3.61
Amount	-19.08***	-12.49***	-12.17***	-4.83	-18.97***	-14.10***	-11.67***	-4.38
	1.44	3.83	2.16	5.24	1.40	3.23	2.15	5.00
R^2	0.256	0.162			0.270	0.202		
N	14637	1865	14637	1865	15376	2509	15376	2509
N-US	14254	1522	14254	1522	14290	1538	14290	1538
N-EU	383	343	383	343	1688	1506	1688	1506
Under-Id			0.000	0.000			0.000	0.000
Hansen J			0.980	0.763			0.998	0.892
Endog			0.000	0.002			0.000	0.000
First Stage								
European C.			-6.53***	-5.94***			-7.38***	-7.16***
			1.07	1.40			0.67	0.91

* p<.10, ** p<.05, *** p<.01

Table XI: **Results for the Estimations that use Multiplicative Spreads**

The Multiplicative Spread sample includes all loans where we measure the loan spread as the all-in-drawn spread divided by the base rate. The results for the estimation that uses all available Multiplicative Spread observations are in columns (1)-(4). The Multiplicative Spread Sample One Year uses all multiplicative spread observations with one year or less maturity. The results for the estimation that uses the multiplicative spread for loans with one year maturity are reported in columns (5)-(8). At the bottom of the table we report the first stage coefficient estimate on the European dummy. Debt rating, loan type, loan purpose, 2-digit SIC, and year dummies are included in the regressions but are omitted from the table. All standard errors are clustered at the firm level and are reported below the coefficient estimates.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Multiplicative Spread Sample				Multiplicative Spread Sample One Year			
	OLS		IV		OLS		IV	
	Full	Matched	Full	Matched	Full	Matched	Full	Matched
European C	-48.22***	-45.51***	-10.41	3.85	-34.57***	-23.38**	-8.39	-0.86
	4.52	5.62	8.17	16.03	8.27	11.06	13.11	17.01
Total Vol.	0.94***	1.44***	5.62***	7.79***	0.61***	1.11***	5.24***	6.62***
	0.07	0.17	0.83	1.98	0.12	0.33	1.57	2.50
Leverage	91.37***	106.61***	52.83***	59.28**	103.47***	92.92**	76.30***	105.71**
	8.43	16.46	11.86	29.05	20.63	41.97	23.58	50.29
Cash	42.33***	60.99*	-35.71*	-24.45	19.15	-16.58	-99.44*	-130.08
	13.95	33.41	21.70	44.22	27.68	63.25	50.96	79.10
Age	-20.87***	-19.13***	-16.52***	-23.01**	-26.44***	-35.03**	-17.34	-35.10*
	3.63	6.37	4.78	9.33	9.19	17.07	10.81	19.10
Average Q	-13.59***	-10.70***	-12.48***	-10.59***	-9.40***	-4.27	-6.92**	-7.68
	1.44	2.61	1.79	3.57	2.49	3.75	2.97	5.76
Size	-8.28***	-10.81***	-1.86	-7.13**	-9.19***	-3.63	-4.56	4.12
	1.17	2.22	2.02	3.57	2.07	3.95	3.94	5.85
Amount	-14.24***	-11.12***	-8.17***	0.76	-6.20**	-10.90*	-2.45	-10.13
	1.17	2.79	1.97	5.39	2.43	6.04	3.53	7.00
R^2	0.253	0.205			0.188	-0.026		
N	14607	2837	14607	2837	2793	483	2795	483
N-US	13101	1479	13101	1522	1479	279	1479	279
N-EU	1506	1358	1506	1358	1506	204	1506	204
Under-Id			0.000	0.000			0.000	0.019
Hansen J			0.760	0.966			0.554	0.336
Endog			0.000	0.000			0.001	0.003
First Stage								
European C.			-8.11***	-7.72***			-5.97***	-4.10***
			0.67	0.90			1.22	1.77

* p<.10, ** p<.05, *** p<.01

Table XII: **Results for Estimations that use Default Measures**

The dependent variable is the all-in-drawn spread on the loan. The default probability is measure by *Merton* or vendor supplied *Alternative* variables. The estimations use the matched sample. The first two columns report the OLS results and the last two columns report IV results. Debt rating, loan type, loan purpose, 2-digit SIC, and year dummies are included in the regressions but are omitted from the table. All standard errors are clustered at the firm level and are reported below the coefficient estimates.

	(1)	(2)	(3)	(4)
	OLS	OLS	IV	IV
European C.	-39.27***	-44.53***	5.13	-2.55
	7.05	6.73	13.44	16.41
Total Vol.	1.54***	1.51***	7.39***	6.64***
	0.22	0.21	1.55	1.88
Merton	4.09		-21.98**	
	5.99		8.82	
Alternative		3.34		-31.76**
		4.42		13.41
Leverage	115.81***	105.77***	83.06***	97.78***
	23.75	21.18	26.86	24.54
Cash	83.53*	73.78*	6.97	-2.96
	42.69	39.40	48.95	50.85
Age	-20.07**	-15.13**	-14.00	-11.65
	8.63	7.41	10.73	9.10
Average Q	-20.72***	-17.60***	-17.97***	-17.78***
	3.50	3.44	4.77	4.00
Size	-12.67***	-10.95***	-7.09*	-6.77*
	3.10	2.86	4.10	3.92
Amount	-10.18***	-9.49***	-6.38	-5.82
	3.67	3.62	4.24	4.22
R^2	0.176	0.159		
N	2164	2413	2164	2413
N-US	1294	1414	1294	1414
N -EU	870	999	870	999
Under-Id			0.000	0.000
Hansen J			0.427	0.195
Endog			0.000	0.001

* p<.10, ** p<.05, *** p<.01

B. Appendix B

Table B.I: **Logistic Regression Results for the Matching Procedure**

This table reports logistic regression results used for the propensity score matching procedure. The dependent variable is the European dummy. The first column uses the borrower country specification and the second column uses the market of syndication to define the European dummy. 2- digit SIC dummies are included in the regressions but are omitted from the table.

	(1)	(2)
	Borrower Country	Borrower Market
Leverage	-0.03	0.07
	0.17	0.17
Cash	0.63**	0.93***
	0.31	0.31
Age	-1.35***	-1.38***
	0.07	0.07
Average Q	-0.23***	-0.23***
	0.04	0.04
Size	0.30***	0.31***
	0.03	0.03
Amount	0.42***	0.41***
	0.03	0.03
A	0.09	0.17
	0.37	0.37
Baa	-0.31	-0.30
	0.37	0.37
Ba	-0.96**	-1.10***
	0.39	0.39
B	-0.78**	-0.90**
	0.40	0.40
Caa	-0.58	-1.12**
	0.49	0.54
Pseudo R^2	0.246	0.252
N	16185	16227

* p<.10, ** p<.05, *** p<.01

Table B.II: **Main OLS Results for Idiosyncratic Volatility**

The dependent variable in OLS regressions is the all-in-drawn spread on the loan. The top panel, *Panel A*, uses the borrower country specification and the bottom panel, *Panel B*, uses the market of syndication to define the European sample. First two columns do not include total volatility as an explanatory variable, and the last two columns do include. Debt rating, loan type, loan purpose, 2-digit SIC, and year dummies are included in the regressions but are omitted from the table. All standard errors are clustered at the firm level and are reported below the coefficient estimates.

	(1)	(2)	(3)	(4)
	without Volatility		with Volatility	
Panel A: Borrower Country	Full	Matched	Full	Matched
European C.	-56.25***	-62.47***	-49.74***	-53.81***
	4.78	5.88	4.63	5.71
Idio. Vol.			0.88***	1.23***
			0.07	0.17
Leverage	112.13***	121.17***	104.43***	112.89***
	9.08	18.54	8.76	17.35
Cash	76.58***	99.43***	65.44***	85.46**
	13.68	34.81	13.53	34.69
Age	-21.83***	-15.48**	-22.33***	-17.53***
	3.88	6.52	3.79	6.51
Average Q	-14.85***	-12.43***	-14.36***	-12.01***
	1.42	2.96	1.39	2.91
Size	-10.62***	-10.84***	-8.84***	-9.89***
	1.42	2.33	1.41	2.35
Amount	-19.89***	-15.16***	-18.59***	-13.10***
	1.36	2.88	1.34	2.83
R^2	0.241	0.155	0.258	0.177
N	16591	3210	16591	3210
Panel B: Borrower Market				
European M.	-58.77***	-71.36***	-52.37***	-61.02***
	4.66	6.07	4.51	6.08
Idio. Vol.			0.88***	1.22***
			0.07	0.17
R^2	0.243	0.168	0.260	0.191
N	16582	3170	16582	3170

* p<.10, ** p<.05, *** p<.01

Table B.III: **Main IV Results for Idiosyncratic Volatility**

The dependent variable in IV regressions is the all-in-drawn spread on the loan. The top panel, *Panel A*, uses the borrower country specification and the bottom panel, *Panel B*, uses the market of syndication to define the European sample. First two columns report the results for the first stage estimation, and the last two columns report the results for the second stage estimation. Debt rating, loan type, loan purpose, 2-digit SIC, and year dummies are included in the regressions but are omitted from the table. All standard errors are clustered at the firm level and are reported below the coefficient estimates.

	(1)	(2)	(3)	(4)
	1^{st} Stage		2^{nd} Stage	
Panel A: Borrower Country	Full	Matched	Full	Matched
European C.	-7.37***	-6.94***	-0.81	6.87
	0.66	0.86	9.94	18.95
Idio. Vol.			7.52***	9.82***
			1.14	2.52
Cash & STI Vol.	0.07*	0.05		
	0.04	0.07		
Book Equity Vol.	0.13***	0.13***		
	0.02	0.04		
Leverage	7.57***	6.11*	45.81***	54.44
	1.53	3.32	14.93	35.19
Cash	8.95***	8.47**	-19.91	-14.97
	2.23	4.13	22.90	51.10
Age	1.61***	2.52***	-25.96***	-31.32***
	0.62	0.93	5.15	11.10
Average Q	-0.87***	-0.80*	-10.68***	-9.30**
	0.23	0.41	2.00	4.26
Size	-1.81***	-0.69**	4.56	-3.53
	0.24	0.33	3.09	4.14
Amount	-1.51***	-1.66***	-8.81***	1.26
	0.21	0.35	2.52	5.85
Signal/Noise			0 .634	0.570
N	16591	3210	16591	3210
Under-Id			0.000	0.000
Hansen J			0.453	0.359
Endog			0.000	0.000
Panel B: Borrower Market				
European M.	-7.33***	-8.44***	-4.33	-18.03
	0.65	0.84	9.65	12.97
Idio. Vol.			7.46***	6.18***
			1.11	1.42
Cash & STI Vol.-8	0.07*	-0.05		
	0.04	0.06		
Book Equity Vol.-8	0.14***	0.19***		
	0.02	0.04		
Signal/Noise			0 .635	0.520
N	16582	3170	16582	3170

* p<.10, ** p<.05, *** p<.01

Table B.IV: **Main OLS Results with European Time Dummies and Non-Crisis Period**

The dependent variable in OLS regressions is the all-in-drawn spread on the loan. The top panel, *Panel A*, uses the European Time dummies and the bottom panel, *Panel B*, uses the non-crisis period for the estimation. First two columns do not include total volatility as an explanatory variable, and the last two columns do include. Debt rating, loan type, loan purpose, 2-digit SIC, and year dummies are included in the regressions but are omitted from the table. All standard errors are clustered at the firm level and are reported below the coefficient estimates.

	(1)	(2)	(3)	(4)
	without Volatility		with Volatility	
Panel A: EC Time Dummies	Full	Matched	Full	Matched
EC 98-00	-59.12***	-73.28***	-48.36***	-58.94***
	11.55	11.91	10.90	11.62
EC 01-03	-75.98***	-90.33***	-64.96***	-76.05***
	7.77	10.59	7.56	10.41
EC 04-07	-48.46***	-48.36***	-39.94***	-38.79***
	6.78	8.38	6.58	7.90
EC 08-11	-50.65***	-59.83***	-41.86***	-44.74***
	9.91	10.93	9.68	10.80
Total Vol.			1.11***	1.47***
			0.07	0.17
Leverage	111.67***	118.57***	101.96***	110.66***
	9.06	18.35	8.68	17.11
Cash	76.73***	97.81***	57.10***	75.63**
	13.70	34.75	13.60	34.89
Age	-21.86***	-14.49**	-20.67***	-15.50**
	3.88	6.52	3.77	6.51
Average Q	-14.85***	-12.38***	-14.42***	-12.10***
	1.41	2.96	1.37	2.92
Size	-10.50***	-10.41***	-8.80***	-9.75***
	1.42	2.29	1.40	2.32
Amount	-19.89***	-15.26***	-18.06***	-12.47***
	1.35	2.86	1.34	2.82
R^2	0.242	0.158	0.267	0.188
N	16591	3210	16591	3210
Panel B: Non-Crisis Period				
EC 98-07	-54.06***	-57.95***	-44.68***	-47.07***
	5.25	6.68	5.06	6.41
Total Vol.			1.12***	1.44***
			0.08	0.19
R^2	0.264	0.161	0.290	0.192
N	14249	2424	14249	2424

* p<.10, ** p<.05, *** p<.01

Table B.V: **Main IV Results with European Time Dummies and Non-Crisis Period**

The dependent variable in IV regressions is the all-in-drawn spread on the loan. The top panel, *Panel A*, uses the European Time dummies and the bottom panel, *Panel B*, uses the non-crisis period for the estimation. First two columns report the results for the first stage estimation, and the last two columns report the results for the second stage estimation. Debt rating, loan type, loan purpose, 2-digit SIC, and year dummies are included in the regressions but are omitted from the table. All standard errors are clustered at the firm level and are reported below the coefficient estimates.

	(1)	(2)	(3)	(4)
	1^{st} Stage		2^{nd} Stage	
Panel A: EC Time Dummies	Full	Matched	Full	Matched
EC 98-00	-10.02***	-9.82***	-0.74	0.97
	1.42	2.44	13.44	26.14
EC 01-03	-10.00***	-9.49***	-16.09	-16.65
	1.18	1.61	12.36	21.16
EC 04-07	-7.66***	-6.49***	-2.45	0.83
	0.84	1.12	9.76	13.71
EC 08-11	-7.80***	-10.01***	-2.58	18.07
	1.01	1.39	11.76	21.04
Total Vol.			6.01***	7.58***
			0.84	1.76
Cash & STI Vol.	0.09**	0.08		
	0.04	0.08		
Book Equity Vol.	0.16***	0.16***		
	0.02	0.04		
Leverage	7.37***	4.65	58.44***	76.40***
	1.62	3.35	12.36	25.38
Cash	12.78***	10.79**	-30.77	-17.19
	2.37	4.44	22.09	44.30
Age	0.24	1.82**	-15.25***	-19.49**
	0.66	0.91	4.79	8.91
Average Q	-0.78***	-0.78*	-12.53***	-11.12***
	0.24	0.45	1.76	3.63
Size	-1.28***	-0.35	-1.27	-7.24**
	0.23	0.31	2.16	3.28
Amount	-1.69***	-1.89***	-9.96***	-0.85
	0.21	0.34	2.17	4.91
N	16591	3210	16591	3210
Under-Id			0.000	0.000
Hansen J			0.565	0.426
Endog			0.000	0.000
Panel B: Non-Crisis Period				
EC 98-07	-8.41***	-7.54***	-8.30	-12.26
	0.73	0.97	9.17	12.48
Total Vol.			5.47***	5.99***
			0.86	1.45
N	14249	2424	14249	2424
Under-Id			0.000	0.000
Hansen J			0.563	0.155
Endog			0.000	0.000

* p<.10, ** p<.05, *** p<.01

Table B.VI: **US and European Samples**

The main sample is divided into the US and European subsamples. The dependent variable in regressions is the all-in-drawn spread on the loan. First four columns use the full sample for the estimation, and the last four columns use the matched sample for estimation. Debt rating, loan type, loan purpose, 2-digit SIC, and year dummies are included in the regressions but are omitted from the table. All standard errors are clustered at the firm level and are reported below the coefficient estimates.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full Sample				Matched Sample			
	OLS		IV		OLS		IV	
	US	Europe	US	Europe	US	Europe	US	Europe
Total Vol.	1.05***	2.11***	5.37***	8.06***	1.19***	1.96***	5.36***	7.37***
	0.07	0.44	0.84	2.94	0.17	0.45	1.55	2.69
Leverage	101.50***	90.88***	61.55***	62.74*	92.23***	105.83***	65.41**	73.45**
	8.93	27.13	12.67	32.44	21.53	28.76	28.13	34.17
Cash	56.08***	57.06	-22.06	25.75	106.12***	34.62	39.31	-6.37
	13.67	54.66	21.96	57.64	40.19	52.43	50.18	56.60
Age	-21.88***	-17.32*	-16.71***	-5.39	-18.17**	-11.60	-26.48***	-6.26
	4.08	9.58	5.06	12.69	7.66	10.46	10.02	12.13
Average Q	-15.40***	-5.32	-13.80***	-2.43	-21.45***	-4.70	-23.92***	-1.84
	1.37	3.36	1.73	4.11	4.54	3.32	5.21	3.93
Size	-8.68***	-5.90**	-1.05	-5.88*	-11.53***	-6.89**	-10.26**	-5.16
	1.55	2.92	2.37	3.55	3.48	3.16	4.18	3.91
Amount	-18.93***	-9.75***	-12.10***	-1.21	-15.51***	-10.16***	-5.02	-2.20
	1.45	3.21	2.16	5.44	4.34	3.60	6.43	5.31
R^2	0.252	0.063			0.151	0.058		
N	14820	1771	14820	1771	1605	1605	1605	1605
Under-Id			0.000	0.011			0.000	0.004
Hansen J			0.528	0.988			0.113	0.991
Endog			0.000	0.020			0.001	0.029

* p<.10, ** p<.05, *** p<.01

Table B.VII: **Table Robustness**

This table reports results for our robustness checks and uses the matched sample for the estimations. The first two columns uses the Libor sample. Columns (3) and (4) use the spread margin as a dependent variable. Columns (5) and (6) include loan contract terms as additional regressors in the estimation. The last two columns use an interaction term between leverage and total volatility. For all the specifications debt rating, loan type, loan purpose, 2-digit SIC, and year dummies are included in the regressions but are omitted from the table. All standard errors are clustered at the firm level and are reported below the coefficient estimates.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Libor		Spread Margin		Loan Contract Terms		Leverage Interaction	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
European C.	-49.30***	3.05	-42.69***	-0.91	-33.77***	12.12	-49.79***	-8.48
	5.75	15.14	5.70	13.18	6.72	15.96	5.63	15.22
Total Vol.	1.48***	7.59***	1.30***	6.15***	1.22***	7.09***	0.58**	8.87***
	0.17	1.70	0.16	1.46	0.16	1.88	0.25	1.99
Leverage	114.31***	77.30***	88.70***	56.08**	96.17***	70.10***	-6.07	401.66**
	17.27	25.88	16.62	23.64	17.75	25.16	29.35	197.79
Lev × Vol.							2.69***	-7.23
							0.67	4.48
Cash	77.20**	-18.99	59.37*	-16.89	79.94**	-5.64	74.98**	13.71
	34.94	44.20	32.98	40.42	32.58	43.94	33.58	42.87
Age	-16.27**	-19.25**	-12.22**	-13.77*	-14.13**	-15.42*	-18.11***	-16.22*
	6.51	8.80	6.08	8.08	6.42	8.39	6.39	9.02
Average Q	-12.20***	-10.94***	-11.66***	-12.06***	-10.64***	-10.32***	-10.57***	-15.16***
	2.90	3.58	2.76	3.28	2.83	3.37	3.03	4.39
Size	-10.23***	-7.33**	-10.32***	-8.44***	-7.42***	-6.52**	-9.73***	-8.65***
	2.37	3.33	2.39	3.09	2.36	3.16	2.35	3.21
Amount	-12.28***	-0.83	-12.81***	-2.77	-8.10***	-1.88	-12.97***	-1.16
	2.84	4.83	2.87	4.63	2.85	4.21	2.80	4.65
No. Lenders					-13.30***	1.36		
					4.04	6.57		
Maturity					15.84**	27.68***		
					7.61	9.52		
Secured					54.21***	20.65		
					7.88	14.01		
Sec./Unsec. Miss. Dum.					-14.34*	4.55		
					7.62	11.73		
Performance					-17.62***	-6.81		
					6.35	8.00		
General Cov.					31.70**	16.78		
					13.60	18.37		
Financial Cov.					-5.84	-1.18		
					12.42	16.11		
R^2	0.183		0.210		0.221		0.193	
N	1605	1605	2842	2842	3110	3110	3210	3210
N-US	1479	1479	1484	1484	1565	1565	1605	1605
N-EU	702	702	1358	1358	1545	1545	1605	1605
Under-Id		0.000		0.000		0.000		0.015
Hansen J		0.464		0.676		0.539		0.584
Endog		0.000		0.000		0.000		0.000

* p<.10, ** p<.05, *** p<.01

Table B.VIII: **IV Results for the Estimations that use Mean of the Instruments as Additional Regressors**

The dependent variable in IV regressions is the all-in-drawn spread on the loan. The top panel, *Panel A*, uses the borrower country specification and the bottom panel, *Panel B*, uses the market of syndication to define the European sample. Debt rating, loan type, loan purpose, 2-digit SIC, and year dummies are included in the regressions but are omitted from the table. All standard errors are clustered at the firm level and are reported below the coefficient estimates. *Under-Id* test has the null hypothesis that the equation is under identified, so rejection of this test implies that the excluded instruments are relevant, meaning correlated with the endogenous regressors. Null Hypothesis for *Hansen J* test is that the instruments are valid instruments, i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation.

	(1)	(2)	(3)	(4)
	1^{st} Stage		2^{nd} Stage	
Panel A: Borrower Country	Full	Matched	Full	Matched
European C.	-8.83***	-8.65***	-9.07	-0.54
	0.64	0.86	9.82	18.48
Total Vol.			5.68***	7.25***
			0.92	2.01
Cash & STI Vol.-8	0.08**	0.08		
	0.04	0.09		
Book Equity Vol.-8	0.14***	0.15***		
	0.02	0.04		
Mean(Book Equity Vol.)	10.28**	3.63	71.97*	83.68
	4.47	10.45	36.85	86.13
Mean(Cash & STI Vol.)	-5.46***	-3.98	-6.45	9.42
	1.65	2.46	12.98	21.54
Leverage	3.62*	2.31	58.33***	87.25***
	2.01	4.02	13.69	28.91
Cash	4.81	8.27	-84.27**	-79.26
	3.86	8.71	33.24	71.51
Age	0.07	1.59*	-14.80***	-17.92**
	0.67	0.91	4.66	8.55
Average Q	-0.93***	-0.95**	-13.16***	-11.39***
	0.25	0.44	1.79	3.65
Size	-1.40***	-0.49	-1.97	-7.30**
	0.23	0.32	2.23	3.40
Amount	-1.66***	-1.83***	-10.27***	-1.30
	0.21	0.34	2.24	5.11
N	16591	3210	16591	3210
Under-Id			0.000	0.000
Hansen J			0.945	0.729
Endog			0.000	0.000
Panel B: Borrower Market				
European M.	-8.64***	-9.92***	-13.12	-15.33
	0.64	0.85	9.45	16.73
Total Vol.			5.65***	5.83***
			0.91	1.58
Cash & STI Vol.	0.09**	-0.02		
	0.04	0.08		
Book Equity Vol.	0.15***	0.18***		
	0.02	0.04		
Mean(Cash & STI Vol.)	-5.36***	-6.78**	-6.97	5.96
	1.64	3.02	12.80	24.52
Mean(Book Equity Vol.)	10.71**	10.67	68.60*	42.86
	4.47	9.26	36.90	68.54
Observations	16582	3170	16582	3170

* p<.10, ** p<.05, *** p<.01

Table B.IX: **Borrower Market**

This table reports the number of observations at the country level in our data set where we use the market of syndication to define the European sample. The first column reports the number of observations where the market of syndication is US, and the second column reports the number of observations where the market of syndication is Europe.

Countries	US	Europe	Total
Australia	6	0	6
Austria	0	5	5
Belgium	0	19	19
Bermuda	0	1	1
China	1	0	1
Cyprus	0	1	1
Denmark	0	22	22
Finland	0	36	36
France	2	291	293
Germany	9	184	193
Greece	0	11	11
Hong Kong	1	0	1
Ireland	0	29	29
Italy	0	122	122
Luxembourg	0	5	5
Netherlands	12	118	130
New Zealand	2	0	2
Norway	3	36	39
Portugal	0	8	8
Russia	1	0	1
Singapore	2	0	2
Spain	1	157	158
Sweden	0	67	67
Switzerland	1	47	48
United Kingdom	17	554	571
USA	14,766	45	14,811
Total	16582	14824	1758