Has the U.S. bond market lost its edge to the Eurobond market?

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Abstract

The growth of the European financial markets, together with the new, stricter regulations on the U.S. financial system, has spurred a debate about the competitiveness of the U.S. financial markets. In this paper, we compare underwriting costs in the U.S. bond market and the Eurobond market over the last ten years and investigate whether recent changes in the U.S. bond market's relative competitiveness have affected U.S. firms' choice of bond issuing market. Our results show that ten years ago, it was less expensive to issue in the U.S. bond market than in the Eurobond market and that underwriting costs have declined continuously in the U.S. market over the last decade. Importantly, we also find that these costs decreased at an even faster rate in the Eurobond market to the point of eliminating the competitive wedge of the U.S. bond market. These findings are robust to bond-, firm-, and underwriter-specific characteristics and do not appear to be driven by sample selection, as they hold when we consider a sample of issuers that is *both* constant over time and common to both markets. Finally, we find that U.S. firms are increasingly opting to issue their bonds in the Eurobond market instead of the U.S. market, and that this relocation toward the Eurobond market is partly caused by the decline in the relative competitiveness of the U.S. bond market.

1 Introduction

The deregulation trend that characterized the U.S. financial system in the 1980s and 1990s came to a halt recently with the enactment of new regulations. This change, together with the ongoing transformation of the European financial markets, which stemmed from financial liberalization, disintermediation and the introduction of the euro, has given rise to a debate on the competitiveness of the U.S. financial markets. In this paper, we contribute to this debate by investigating the competitive strengths of the U.S. bond and Eurobond markets over the last ten years. Our analysis compares the underwriting costs in these two large bond markets and investigates whether the changes in relative underwriting costs have affected U.S. firms' choice of bond underwriting market.

For half a century, the U.S. banking system was characterized by a separation of commercial banking and investment banking. In 1933, reacting to the wave of bank failures that followed the Great Depression, the U.S. Congress passed the Glass-Steagall Act, separating the two industries. For more than thirty years, firms on both sides seemed to lack the incentive (or the ability) to combine both businesses. Since the 1960s, however, commercial banks and investment banks have tried to expand their activities into each other's strongholds. As a result, the Federal Reserve started to allow bank holding companies to conduct through their so-called Section 20 subsidiaries some investment banking activities. In 1988, the Federal Reserve expanded the set of Section 20 permissible activities to include corporate bond underwriting. To ensure that these subsidiaries met the requirements of Glass-Steagall, these subsidiaries continued to be subject to a set of restrictions, including a requirement that the revenue generated by "ineligible" activities could not exceed 10 percent of the subsidiary's total revenue. This revenue limit was subsequently raised to 25 percent and the set of permissible activities further expanded. This deregulation process culminated with the enactment of the Gramm-Leach-Bliley Act in 1999, which repealed the Glass-Steagall Act.

Commercial banks' entry in the corporate bond underwriting business was important because it increased the competition in this business and led to a reduction in the costs of bond underwriting. Gande, Puri, and Saunders (1999) link the overall reduction in bond gross spreads for domestic U.S. bonds to the competitive impact from the entry of commercial banks in the business.[1] In addition, the arrival of commercial banks in the investment banking

[1] Roten and Mullineaux (2002), however, conclude that the effect of commercial bank entry on bond gross

business made it possible for bond issuers to benefit from potential economies of scope resulting from the combination of lending and underwriting activities.[2] Yasuda (2004) and Drucker and Puri (2005), for instance, find that bond issuers earn a statistically significant fee discount when they have a lending relationship with their underwriters.

Following the massive collapse of Enron and WorldCom as well as the proliferation of corporate accounting scandals, the U.S. Congress reversed this deregulation trend by enacting the Sarbanes-Oxley Act (SOX) in 2002. SOX was designed to improve accounting and financial management and to ensure better corporate governance and shareholder protection. It has ushered in a more rigorous and perhaps more costly disclosure regime for public firms. In particular, Section 404 of SOX, which governs internal controls and financial reporting procedures, is viewed as quite onerous on public firms. This section requires management and company auditors to certify the effectiveness of their internal control structure and their procedures for financial reporting.

Many business leaders argued that SOX would adversely influence the U.S. capital markets and the ability of U.S. firms to access capital. A number of recent studies investigate the claims that the new requirements imposed by SOX have tilted incentives in favor of private ownership (see, for example, Engel, Hayes, and Wang 2004; Leuz, Triantis, Wang 2004). These studies find that after the passage of SOX, a small fraction of U.S. firms exited the public markets (went dark). These exiting firms were typically small with strong incentives to avoid the costs of complying with SOX requirements. Another concern is that the direct and indirect costs that SOX imposes on firms will dissuade U.S. firms from going public or will encourage them to list on overseas exchanges instead. These concerns are not limited to U.S. companies; they also pertain to non-U.S. firms that issue in U.S. public markets or that are seeking access to U.S. capital markets but face more stringent compliance rules (Berger, Li, and Wong 2005; Marosi and Massoud 2004).

The concerns about the negative effects of SOX on the competitiveness of the U.S. financial markets further increased as the financial markets in Europe experienced continued

spreads was transitory after examining a data set spanning a longer period.

[2] A bank that provides commercial banking services to a borrower would find it easier to underwrite the firm's securities as it could use the information it has accumulated over the course of its relationship with the firm. See Kanatas and Qi (1998) for a formalization of this argument, and Rajan (1996) and Santos (1998) for other potential benefits for a firm from relying on its bank lender for underwriting services.

growth. The European financial system has undergone a major transformation in the 1990s brought about by financial sector liberalization and the advent of the euro. Besides eliminating all uncertainty relating to exchange rate risk in the choice of securities denominated in the legacy currencies, the euro relaxed a number of regulatory restrictions on the currency exposures of institutional investors in the euro area.[3] The euro also relaxed the influence of less formal restrictions, such as the so-called "prudent man" rules, that reinforce the well-documented tendency of investor portfolios to be overweight in domestic assets. Investors in the post-EMU period became less constrained in their selection of an underwriter with experience in placing securities in euros as they were when securities were issued in one of the legacy currencies. Lastly, the erosion of rents derived from local expertise in research and marketing reduced the economic barriers to entry for investment houses from outside the euro area. As a result, a more homogeneous capital market and expanded investor base emerged in the post-EMU period, allowing underwriters to compete on a pan-European basis.[4]

The competitive position of U.S. equity markets attracted a lot of attention early last year following the publication of a report in November 2006 by the Committee on Capital Markets Regulation, a non-partisan group of business and academic professionals (see also Zingales (2007) for an academic discussion of these issues). The report offered evidence that U.S. equity markets are losing ground to overseas markets and proposes several reforms, including, among others, proposals to: improve the regulatory process, revise the SOX, simplify enforcement principles, and enhance shareholders rights. However, a recent study by Doidge, Karolyi, and Stulz (2007) does not find any evidence that SOX has adversely affected cross-listings on U.S. stock exchanges. Thus far, much of the interest in the decline of U.S. capital competitiveness has focused on the equity markets. In comparison to equity-based finance markets, bond markets are less glamorous, attracting less media attention and interest from ordinary investors. Yet, corporate bond markets are a crucial source of financing for large and mid-size corporations. If there is one area in which the accelerating pace of disintermediation in Europe and the emergence of euro had a tremendous impact, it is in the Eurobond market. According to

[3]These restrictions include currency-matching requirements that put a ceiling on the permissible mismatch in the currency denomination of assets and liabilities, and portfolio allocation rules that further restrict these investors' ability to allocate funds in foreign securities.

[4]For a more complete overview of the effects of the euro on European financial markets see Danthine et al (2001), ECB (2001), von Thadden (2001) and Galati and Tsatsaronis (2003).

Santos and Tsatsaronis (2004), the arrival of the euro contributed to an important reduction in the costs of bond underwriting in Europe. Over the last ten years, the U.S. bond market has been steadily losing market share to the Eurobond market. In 1995, the volume of corporate issuances in the U.S. bond market totaled $564 billion, roughly double the volume originated in the Eurobond market. This wide gap in issuances has vanished, as the $1.8 trillion volume of corporate issuances in the Eurobond area in 2006 is greater than the $1.5 trillion volume offered in the U.S. bond market.

In this paper, we focus on the U.S. bond market and investigate whether its competitiveness has been affected in recent years. To that end, we compare the competitiveness of the U.S. bond market with that of the Eurobond market over the last ten years. We also investigate whether the recent changes in the relative competitiveness of the U.S. bond market have affected U.S. firms' choice of market in which to issue their bonds. Our results show that ten years ago it was less expensive to issue in the U.S. bond market than in the Eurobond market and that bond underwriting costs have declined continuously in the U.S. market over the last decade. We find, however, that these costs have declined at a faster rate in the Eurobond market to the point of eliminating the competitive wedge of the U.S. bond market. These findings are robust to many bond-, firm-, and underwriter-specific characteristics. Further, our findings do not appear to be driven by sample selection and firm survival, as they continue to hold for a sample of issuers that maintain a constant presence in both markets over time. Our investigation of U.S. firms' choice of bond underwriting market reveals that these firms are increasingly opting to tap the Eurobond market instead of the U.S. market. This relocation toward the Eurobond market is partly caused by the decline in the relative competitiveness of the U.S. bond market.

The remainder of the paper is organized as follows. Section 2 presents our methodology and lists our data sources. In this section, we also describe our sample of bonds issued in the U.S. bond market and the Eurobond market. Section 3 investigates the evolution of bond underwriting costs in the two markets over the last decade. This section also investigates the relative competitiveness of both markets over that period of time. Section 4 analyzes how changes in the competitiveness of both markets affected the bond underwriting costs of U.S. firms and examines whether these cost changes affected U.S. firms' choice of bond underwriting market. Section 5 concludes with some final remarks.

2 Methodology, data and sample characterization

2.1 Methodology

The methodology we adopt in this paper has two parts. The first part investigates the costs of bond underwriting in the U.S. bond and Eurobond markets over time. We pay particular attention to the underwriting costs U.S. firms pay over time to issue on each of these two markets. The second part investigates whether the change in the relative costs of issuing in these markets over time has affected U.S. firms' bond market choice. Below, we outline the methodology used to formally analyze each of these issues.

2.1.1 The cost of bond underwriting in the U.S. bond and Eurobond markets

The first stage of our analysis investigates the underwriting costs in the U.S. bond and the Eurobond markets over time. In particular, we examine the evolution of the gross spreads in these two markets over time. To reduce concerns with sample selection bias, we analyze factors influencing cost of underwriting in these markets for different sub-samples of issuers. To make sure that the changes in gross spreads over time reflect the true cost of bond underwriting, we also investigate the importance of ex ante credit spreads in both markets over time.

Costs: Gross spreads

We start our analysis of the evolution of the costs of bond underwriting in the U.S. bond and Eurobond markets by estimating the following model of gross spreads for each market

$$GROSS\ SPREAD_{ijt} = \alpha_i + \beta\, TIMETREND_t + B'_{ijt}\,\psi + F'_i\,\gamma + U'_{ijt}\,\mu + O'_t\,\eta + \epsilon_{ijt}. \quad (1)$$

where $GROSS\ SPREAD_{ijt}$ is the underwriting spread of bond j issued by firm i in year t, measured as the difference between the offered amount and the proceeds to the issuer, expressed as a percentage of the offered amount (issue size). The gross spread variable is a commonly used measure of the costs of bond issuance which paid to underwriters. $TIMETREND$ is the log of time trend. This variable represents our main variable of interest as it reflects how the cost of bond underwriting changed over time in the market. In some specifications, we replace the time trend variable with time dummies to facilitate the comparison between the costs of bond underwriting in U.S. bond and the Eurobond markets over time.

We investigate the evolution of bond underwriting costs over time controlling for a set of bond-specific variables B. Gross spreads critically depend on the credit quality of the borrower that affects the ability of underwriters to successfully place the offer. The regression specification includes several variables that measure the riskiness of the bond issuer. The specification controls for the credit rating of the bond. To better capture the potential nonlinear effects of the ratings on underwriting costs, we use a set of dummy variables, one for each credit rating of the bond. To reduce the number of explanatory variables measuring credit risk, we use only whole ratings. We complement this set of dummy variables with a dummy variable for unrated bonds and bonds for which we do note have information on the credit rating. We also control for a set of covenants that affect bond risk. We distinguish bonds that are senior subordinated ($SENIOR$), bonds that have a sinking fund ($SINK\ FUND$), and callable bonds ($CALLABLE$). In addition, the regression model control bonds issued under Rule 144A ($RULE144A$), the maturity of the bond ($MATURITY$) and for the size of the issue ($AMOUNT$). Because longer maturity bonds tend to be riskier, underwriters may demand a higher compensation to underwrite these bonds. Often larger issues are offered by bigger more diversified and therefore more creditworthy firms. If economies of scale are prevalent in the underwriting business, we would expect larger issues to pay lower underwriting costs.

In addition to these bond controls, the gross spread specification includes a set of firm-specific variables, F. We distinguish between financial and nonfinancial firms by including the dummy variable $NONFINANCIAL$. Given that there may be systematic differences between these two types of firms we also rerun our models for the subset of nonfinancial firms alone. Because there is more information available to investors about publicly listed firms, which may help underwriters place the bonds of these firms, the model includes a dummy variable identifying these firms $PUBLIC$. Lastly, we control for the firm's industry as defined by its 1-digit SIC code because each industry may face additional risks that are not captured by the list of control variables presented above.

Our next set of variables controls for features of the bond underwriter and for the underwriting syndicate, U. Since larger syndicates are better able to diversify the risks of issuance, we control for the number of underwriters in the syndicate ($UNDERWRITERS$). Similarly, because larger underwriters are better positioned to absorb these risks, the specification controls

for the market share of the underwriter(s) in the bond syndicate ($UNDERWRITERSHARE$).[5] Larger underwriters may also be able to issue bonds at a lower cost because they are usually perceived to have a higher reputation.[6] Financial firms often manage their own bond issues, typically underwriting debt for itself or for one of its subsidiaries. We distinguish these issues through the dummy variable ($SELF\ MANAGED$). Lastly, to account for potential synergies between lending and bond underwriting, which could lower bond underwriting costs, we control for these relationships by including in our model of gross spreads the dummy variable $LOAN - RELATIONSHIP$ that takes the value 1 if the bond underwriter has also served as a loan arranger to the issuing firm over a five-year period prior to the bond offering.[7] It is important to note that lending relationships can occur with both commercial banks and investment banks.

Finally, we control for a set of variables, O, which are unrelated to the issuer, the bond and the underwriting syndicate, but can affect the costs of underwriting. We account for the currency denomination of the bond through a set of dummy variables. When we investigate the gross spreads in the U.S. bond market, we include a dummy variable, $RECESSION$, which takes the value 1 if the bond was issued during the 2001 recession, as the additional difficulties of placing bonds during recessions may lead underwriters to demand a higher compensation from firms.

When we estimate our models of gross spreads, we add our three sets of controls sequentially since some of the variables in these sets may be jointly determined with the bond's gross spreads. To better capture the firm variation in gross spreads, we estimate our models both with a pooled regression and with firm fixed effects. In addition, we estimate our model of

[5]The market shares represent the fraction of bond underwriting business done by the lead bond underwriter bank in the year prior to the date of issue.

[6]Livingston and Miller (2000), Yasuda (2004), and others, find that investment banks with a larger market share charge lower bond underwriting fees.

[7]Yasuda (2004), for instance, finds that firms which have lending relationships with their bond underwriters pay lower gross spreads. To determine the presence of a lending relationship, we first matched the name of bond issuer to the name of the borrower in the Loan Pricing Corporation's Dealscan database. From this initial match, we are able to establish whether the bond issuer had also borrowed in the syndicated loan market prior to the bond offering. Subsequently, the names of bond underwriters are matched to the lead managers of the loan syndicate. This step establishes the actual presence of lending relationship between the issuer and the bond underwriter, albeit it is only confined to syndicated loans.

gross spreads for various subsamples to address potential sample selection biases. For instance, because the sample of issuers changes over time, we estimate the model including only issues for firms were active in the bond market in earlier part of the sample period. Since some of these borrowers drop out of the market at a later date, we re-estimate our model limiting the sample to bonds issued by firms that were present in the market *both* at the beginning and at the end of our sample period. Further, because there may be potential systematic differences in the set of firms that issue in the U.S. bond and Eurobond markets, we re-estimate the gross spread specifications using the aforementioned subsamples with the additional condition that the issuers must have issued on both markets.

Costs: Ex ante credit spreads

We complement our previous investigation on bond underwriting costs over time with an investigation on the ex ante credit spreads on each market during the same time period. An important reason for investigating credit spreads is that underwriters may choose to offset their declining fees by raising bond yields, effectively lowering the guaranteed price to issuers. We estimate the following model of ex ante credit spreads

$$CREDIT\,SPREAD_{ijt} = \alpha_i + \beta\,TIME\,TREND_t + B'_{ijt}\,\psi + F'_i\,\gamma + U'_{ijt}\,\mu + O'_t\,\eta + \epsilon_{ijt}. \quad (2)$$

where $CREDIT\ SPREAD_{ijt}$ is the percentage point difference between the ex ante yield to maturity of the bond j issued by firm i in year t and the yield on an equivalent maturity U.S. Treasury bond or EU bond, respectively, when we examine spreads in the U.S. market and the Eurobond market.

We estimate this model controlling for the same set of bond- and firm-specific controls used to investigate gross spreads. In addition, the specification controls for the slope of the yield curve in each market ($TREASURY\ SLOPE$ and $EURO\,SLOPE$ in the U.S. bond and Eurobond market respectively) and for the short term rate in each market ($1YEARTREASURY$ and $1YEAR\,EURO$ in the U.S. bond and Eurobond market respectively) to account for the state of the economy at the time of the issue. [8]

[8] We compute the $TREASURY\ SLOPE$ as the difference between the yields of constant maturity Treasuries with 10 and 1 years and the $1YEARTREASURY$ as the yield on the 1 year Treasury with constant maturity. We compute the $EURO\ SLOPE$ as the difference between the 10 and 1 year euro constant maturity swaps.

2.1.2 Bond underwriting costs and firms' market choices

The second part of our methodology investigates whether the evolution of the relative cost of bond underwriting in the U.S. bond and Eurobond markets has affected the choice of U.S. corporate borrowers to issue in the home market or abroad. Modeling this choice is a nontrivial task because we need to capture the joint nature of the decision to issue in either market. The latent nature of the implicit costs determining this decision adds to the complexity of the estimation.

To properly analyze the endogenous nature of the decision to issue in either market, we use a two-stage methodology. In the first stage, we estimate the shadow cost of what a bond issuer (American or foreign firm) would pay if it issued in the U.S. bond market or the Eurobond market. To get an estimate for the cost of issuing in each market, we estimate a gross spread pricing model analogous to the model of gross spreads presented in the previous section for each market. Our gross spread model includes many of the same controls considered above (equation 1), except for the controls related to the underwriting syndicate (U) because this choice is not yet determined at this stage. To ensure that the forecasts of gross spread are always positive, we use a semi-log functional specification for the first-stage estimation. This pricing model essentially proxies the ex ante cost structure U.S. firms face at the time they are considering to issue in the two competing markets. Estimates for these underwriting fees are derived using a 5-year rolling period regression model. For example, to derive a shadow price for company considering issuing bonds in 2000, we estimate a gross spread regression model for the period 1995-1999. From this first stage, we derive an instrument for the average gross spread paid by a comparable U.S. firm considering to issue in the U.S. bond market or the Eurobond market at time t. Using the estimated shadow costs in the U.S. and Eurobond markets, ($\widehat{GS}_{ti}^{U.S.}$) and ($\widehat{GS}_{ti}^{EU}$), respectively, we can define the relative gross spread ratio as follows:

$$GS_{ratio} = \frac{\widehat{GS}_{ti}^{U.S.}}{\widehat{GS}_{ti}^{U.S.} + \widehat{GS}_{ti}^{EU}}.$$

Note that by design, the gross spread ratio is between 0 and 1. A ratio greater than 0.5 indicates that underwriting costs are higher in the U.S. bond market relative to the Eurobond

We complemented these yields for the period prior to the euro with data from Germany. We compute the $1YEAR\,EURO$ as the Euro 1 year swap rate again complemented with data from Germany for the period prior to the euro.

area. In contrast, a ratio smaller than 0.5 indicates that these costs are higher in the Eurobond market.

In the second stage of our analysis, we use a logistic regression model to investigate if the gross spread ratio (the instrument for shadow price), estimated from the first step, affects U.S. firms' decision to issue either in the U.S. bond market or in the Eurobond market. More formally, this binary choice model is defined by:

$$y^*_{ti} = \alpha + \beta\, GS_{ratio} + X_{ti}\, \gamma + u_{ti},$$

where

$$\begin{array}{llll} y_{ti} = 1 & if & y^*_{ti} \geq 0 & \text{Firms issue in U.S. bond market,} \\ y_{ti} = 0 & if & y^*_{ti} < 0 & \text{Firms issues in Eurobond market,} \end{array}$$

such that u_{ti} is white noise error. The dependent variable y^*_{ti} can be viewed as a latent index of a borrower's willingness to issue in the U.S. bond market.

We examine the importance of the relative costs of issuance in U.S. firms' decision to issue at home or abroad controlling for a number of other factors X that are likely to affect this decision. The self-regulated character of the Eurobond market suggests that it will be easier for safer firms to access this market. We therefore account for the credit rating of the issuer in our logistic model through a set of dummy variables. Firm size is also likely to play a role in the bond market choice not only because larger firms tend to be more diversified and thus safer, but also because their name recognition is likely to make it easier to access the foreign market. We use issue proceeds to proxy for firm size. The currency denomination of the bond issue is also likely to affect the market choice. While it is possible to issue foreign currency denominated debt in the U.S. bond market, firms might find the Eurobond market more amenable to foreign-currency debt because it is dominated by large international institutional and foreign private investors that have no qualms investing in their own currencies.

The Eurobond market is a good outlet for internationally active companies to hedge foreign currency exposures. One would therefore expect that U.S. firms that have a large network of foreign subsidiaries and receive a significant fraction of their income from abroad to be more inclined to issue in the Eurobond market. To capture this potential desire to diversify the sources of long term funding, we include in the logistic regression a firm's ratio of foreign sales divided by total sales (domestic plus foreign).

Consistent with our previous specifications, we address concerns sample selection and survival issues, estimating the logistic model for the entire set of U.S. issuers and for the constant sample of U.S. firms that issued at the beginning of the sample period. We also estimate that model after we further limit our sample to those U.S. firms that issued both at the beginning and at the end of the sample period.

2.2 Data

We use several sources of information to construct our sample. The data on corporate bond issuance in the U.S. bond market and the Eurobond market are obtained from the Thomson Financial Securities Data Corporation (SDC) Global New Issues database. The analysis focuses on the U.S. bond and the Eurobond markets because they are the most viable sources of debt financing for internationally active U.S. and foreign companies. Although the U.S. bond market is considered as a domestic market, it has historically attracted a lot of foreign issuers (commonly referred to as Yankee bonds). More importantly, many of the U.S. firms issuing domestically are also actively participating in the Eurobond markets. All other peripheral domestic bond markets in developed and emerging economies are not included in this analysis.[9]

We use the Loan Pricing Corporation's (LPC) Dealscan database to identify the firms in our sample that borrow from their bond underwriters and based on this information identify their bank lending relationships. This database contains information on some non-syndicated loans, but most of its entries are syndicated loans. Although LPC coverage goes as far back as the beginning of the 1980s, in the earlier half of the 1980s, the database has a somewhat

[9]The definition for the Eurobond market has evolved over the years. Prior to the introduction of the euro in 2002, a Eurobond represented a bearer security offered by issuers domiciled in any country but issued in other than the country's currency. After the introduction of the euro, this distinction became redundant because the euro began to function as a common denominator for many European issuers. Eurobonds are underwritten by international syndicate of banks and are not subject to national regulation. In contrast to Eurobonds, "foreign bonds" are issued in the various domestic markets in the country's currency and are subject to all home rules and regulations. Interest in foreign bonds, however, is waning as most of the international issues are now largely offered in the Eurobond market. Considering all these definitional changes and shifts in these debt markets, our sample of Eurobond issues collected from the SDC database is broadly defined to include: Eurobond issues, global bonds (Eurobonds issued in multiple countries), and foreign bonds. The latter category is included retroactively to have a more balanced sample because what was classified as a foreign bond before the adoption of the euro is now issued as a Eurobond security.

reduced number of entries but its comprehensiveness has increased steadily over time. Finally, the information on the distribution of foreign and domestic sales used to proxy for U.S. firms' activity in foreign countries was obtained from the Bureau van Dijk Osiris database.

2.3 Sample characterization

Our sample includes all corporate bonds issued in the U.S. bond and Eurobond markets between January 1, 1995 and December 31, 2006. This sample period offers a long horizon to study the pre- and post-EMU cost structure of the bond issuance. Moreover, this period corresponds roughly to the time during which commercial banks began to actively compete with investment banks in securities underwriting both domestically and in the Eurobond market.[10] We exclude from our sample all bonds with any convertible features as well as bank notes.

Table 1 summarizes the sample of bonds according to a subset of controls used in our analysis of gross spreads. The left panel of the table compares bonds issued in the U.S. bond market with those issued in the Eurobond market. A comparison of the two samples shows that that the U.S. sample has a larger share bonds issued by nonfinancial firms and by private firms than the Eurobond sample. The former sample has both a higher share of bonds (including those with missing rating) rated investment and below grade than the latter sample. In contrast, the Eurobond sample has a much higher share of bonds where the rating is missing. The comparisons in the table also reveal that the U.S. bonds are larger and have a slightly longer maturity than those issued in the Eurobond market. U.S. issuers appear to rely more extensively on the underwriters they have relationships with and on banks that have a larger share of the market to place their bonds than Eurobond issuers. Underwriting syndicates in the U.S. on average have fewer banks than syndicates in the Eurobond market. Finally, the practice of banks underwriting bonds for themselves (or their subsidiaries) seems to be more prevalent in the U.S. bond market than in the Eurobond market.

A more informative comparison is provided by the analysis of a constant sample of firms that have issued at least once in each market during the sample period (middle panel) and U.S. issuers that have issued at least once in both markets during the sample period

[10] The Federal Reserve gradually eased restrictions on bond securities underwriting activities for banks starting in 1989. Initially, Federal Reserve rules restricted revenues from securities-related activities to 10 percent. This ceiling was raised to 25 percent in 1996. The Glass-Steagall Act restrictions were formally lifted with the enactment of the Gramm-Leach-Bliley Act of 1999.

(right panel). Comparing the differences between these samples of bonds with the differences reported in column 3 for the original samples, it becomes apparent that as we shift our focus to the set of issuers with access to both markets and to the set of U.S. firms with access to both markets that the samples of bonds issued in the two markets become more similar. Note that the absolute value of the differences computed in the middle and right panels of the table are generally smaller than the differences reported in the left panel of the table. This similarity in sample features is important for our objective of investigating the relative cost of bond underwriting in both markets because it reduces concerns that our findings are attributed by sample selection biases rather than to the competitive edge of each market over time.

Table 2 compares the costs of bond underwriting in the U.S. bond market and the Eurobond market both at the beginning and the end of the sample period. Based on the results from the top panel of the table, which considers all issuers in both markets, we observe that at the beginning of the sample period, it was significantly more expensive to issue bonds in the Eurobond market than in the U.S. market. Still according to that panel, even though underwriting costs declined significantly in both markets, this gap did not appear to have affected the relative costs of issuing in both markets. If these findings were robust they would suggest that the U.S. bond market did not lose its competitive edge to the Eurobond market over the last ten years. However, the results from the middle panel of Table 2, representing firms that issued at least once in the two bond markets over the same period and thus are therefore less prone to sample selection effects, point to a different interpretation. More specifically, these results reveal that the costs of bond underwriting declined faster in the Eurobond market than in the U.S. bond market over that period of time. Thus, even though by the end of the sample period it was still more expensive to issue in the Eurobond market, its relative competitiveness vis-ávis the U.S. market has vastly improved.

The results from the bottom panel of Table 2, which further restricts of samples to U.S. firms with access to both markets, add further support to that insight. While the U.S. bond market is still more attractive than the Eurobond market in the sense that it offers lower underwriting costs, it has lost some of its competitive edge over the last decade. It remains to be seen if these results continue to hold when we properly account for other factors that determine the costs of bond underwriting and use a more efficient sample selection strategy that limits the analysis to the set of issuers with access to both bond markets. We investigate

these issues in the coming sections.

3 Underwriting costs in the U.S. bond and Eurobond markets

In this section we report the results of our investigation on the relative costs of bond underwriting in the U.S. bond and the Eurobond markets over the period going from 1995 to 2006. We first look at the underwriting costs in each market separately and then compare them over time to ascertain whether there has been a change in the relative competitiveness of the two bond markets.

3.1 Gross spreads in the U.S. bond market

Table 3 reports the results of our model of gross spreads for bonds issued in the U.S. bond market over the 1995-2006 time period. The left panel reports the results for the entire sample of bond issues. The right panel, in turn, considers only bonds of nonfinancial issuers. Each panel has three models. The first model controls for the characteristics of the issuer and those of the bond that are likely to affect the cost of underwriting. The second model expands this model by controlling for the character of the underwriting syndicate. Finally, the third model further accounts for the currency of the issue and distinguishes the bonds issued during the 2001 recession.

Regardless of whether we consider bonds issued by financial and nonfinancial firms or limit our analysis to bonds issued by the latter firms and irrespective of the model specification, we find that during the period under investigation there was a decline in the costs of bond underwriting in the U.S. market. Our control for the costs of bond underwriting over time, the log of time trend, is negative and highly statistically significant in all of the models of gross spreads. It appears, therefore, that the decline in the underwriting costs that Gande, Puri, and Saunders (1999) detected with the arrival of commercial banks in the investment banking business following the repeal of the Glass-Steagall Act continued even after 2000 – the last year of their sample.

With respect to the coefficients of the control variables that we use in these models, they are generally consistent with the discussion given in the methodology subsection. Underwriting costs are higher for risky bonds. Lower rated bonds and longer maturity bonds carry higher gross spreads. In contrast, senior subordinated bonds and bonds that have a sinking fund have

lower gross spreads. According to our findings, callable bonds and bonds issued under Rule 144A carry higher gross spreads. There appears to be economies of scale in the underwriting business as larger issues pay lower gross spreads. Since larger issues usually are offered by bigger and usually safer firms, it is possible that the narrower gross spreads reflect the greater risk exposure of smaller issues.

Our results also show that bonds issued during recessions carry higher gross spreads, possibly to account for the higher risk that underwriters face to place bonds during downturns. Consistent with Livingston and Miller (2000) and Yasuda (2004) our findings show that larger investment banks charge lower gross spreads on the bonds that they underwrite. This is possibly attributable to the fact that these banks, which tend to have a higher reputation, also are involved in underwriting safer bonds. Our results further reveal the presence of lending relationship with the underwriter lowers the gross spreads on the public bonds the firm issues. This result is in line with Yasuda's (2004) and Drucker and Puri's (2005) finding that bond issuers earn a statistically significant fee discount when they have a lending relationship with their underwriters.

According to our results, publicly listed firms pay lower underwriting costs than privately held firms possibly because there is more information available about them, which makes it easier for investment banks to place their bonds. Lastly, our findings indicate that bonds underwritten by investment banks for their own use carry a higher gross spread. This is a novel and interesting finding. The cost premium paid on these self-underwritten bonds could be the result of an internal price transfer or alternatively to compensate the investment banking unit for the extra costs it will incur as a result of the conflicts of interest inherent to these bond issues.

Before we turn out attention to the Eurobond market, we discuss briefly the results of some robustness checks examining the decline of gross spreads in the U.S. bond market. The results presented above were obtained from pooled regressions. To compensate for the potential implications of firm differences, we re-estimated our model of gross spreads with firm fixed effects. Moreover, to account for the possibility that the decline in gross spreads is driven by an improvement in the pool of issuers in the later part of the sample, we re-estimated of model of gross spreads on the subsample of bonds offered by firms that issued at least

once during the early part of the sample period.[11] Lastly, because the previous test does not guarantee a constant sample throughout the sample period (some of the earlier issuers may not return to the market at a later date), we re-analyzed our model of gross spreads by further limiting the sample to bonds to those firms that issued *both* at the beginning and at the end of our sample period.[12] The results of these tests are reported in Table 4. As before, we estimate these models for the entire sample of issuers and for the sample of nonfinancial issuers alone. For the sake of brevity, we report the results only for the model of gross spreads that includes all of our controls.

Looking at Table 4, and in particular focusing on our main variable of interest – the time trend, we find that this variable continues to be negative and strongly significant in all of our robustness tests. Since this finding holds for both the entire set of bond issuers as well as the samples we design to account for some potential sample selection biases, this observed decline in the underwriting costs in the U.S. bond market is likely to have been caused by the growing competition in the bond underwriting business and efficiency gains that bond underwriters have been able to generate over time. We next report the results of our investigation on the costs of bond underwriting in the Eurobond market.

3.2 Gross spreads in the Eurobond market

Table 5 reports the same set of models presented in Table 3, but this time estimated for bonds issued in the Eurobond market.[13] As in the U.S. bond market regardless of whether we consider the entire sample of issuers or just nonfinancial issuers, and notwithstanding the set of controls we use in our model of gross spreads, we find that there was a decline in the costs

[11] We report the results when we limit our sample to bonds of those firms that issued at least once during the first three years of our sample period. We have also considered alternative horizon scenarios such as firms that issued in the first two or four years of the sample period and got similar results.

[12] As in the previous robustness test, we report the results when we limit our sample to bonds of those firms that issued at least once during the first three *and* the last three years of our sample period. We get similar results when we consider four-year windows; however, the sample becomes too small when we consider the two-year windows.

[13] There are some minor differences between the sets of controls used in both tables largely because of some differences between the two markets. For example, in the Eurobond market we do not control for Rule 144A bonds because these are specific to the U.S. bond market.

of bond underwriting in the Eurobond market over the same time period. The time trend variable is always negative and highly statistically significant. This result extends and affirms the study by Santos and Tsatsaronis (2003) that finds that in the two years subsequent to the introduction of the euro, there was a reduction in the costs of bond underwriting in the euro area.

With respect to the remaining controls, they are also similar with the findings based on the U.S. market. There are, however, two notable exceptions. First, while on average publicly listed firms pay lower underwriting costs when they issue in the U.S. bond market, these firms seem to pay higher costs in the Eurobond market. Second, while lending relationships were found to be beneficial to issuers in the U.S. bond market as they contributed to a reduction in bond underwriting costs, there is no strong evidence of a similar benefit from relationship lending in the Eurobond market. It is worth noting, though, that our data source for these lending relationships – the LPC Dealscan database – is more comprehensive on loans taken out by U.S. firms than on those granted to foreign firms. As a result, our control for lending relationships of non U.S. issuers in the Eurobond market is likely to be noisy.

In Table 6, we report the results of the same robustness tests we did in the U.S. bond market for the bonds issued in the Eurobond market. A quick look at Table 6 reveals that the time trend continues to be negative and statistically significant in all robustness tests. Thus, the decline in the costs of bond underwriting in the Eurobond market identified above does not appear to be driven by sample selection. Similar to the U.S. bond market, competition and efficiency improvements in the bond underwriting business also seem to have lowered the costs of bond underwriting in the Eurobond market.

3.3 Gross spreads and bond underwriting costs

The results of the previous subsections show that the compensation paid by firms to underwriters has declined both in the U.S. bond market and the Eurobond market over the 1995-2006 period. We have interpreted this decline as evidence that the costs of bond underwriting have declined in both markets. It is possible, however, that underwriters might seek to offset the negative effect of these declining gross spreads on their expected profits by raising bond yields. Higher bond yield lower the prices they guarantee issuers and effectively increase the probability that they will place these issues. If this were to happen, then the savings that bond issuers

attained from lower gross spreads could be offset by lower net proceeds stemming from higher bond yields.

To ascertain this possibility, we investigate the ex-ante credit spreads over time on both markets following the same approach adopted in the previous subsection to investigate the gross spreads. In the case of bonds issued in the U.S. bond market, we compute their ex-ante credit spreads over the Treasury with the same maturity of the bond. Further, we add to the same set of controls used to investigate the gross spreads the $TREASURY\ SLOPE$ (defined as the difference between the 10 year and 1 year maturity U.S. Treasuries) and the $1YEAR\ TREASURY$ (defined as the U.S. Treasury 1 year constant maturity). Because the sample predates the arrival of the euro, we use the two alternative approaches to compute ex-ante credit spreads in the Eurobond area. In the first approach, we compute the spreads over the U.S. Treasury with the same maturity of the bond and add the variables $TREASURY\ SLOPE$ and $1YEARTREASURY$ to our model of credit spreads. The second approach uses a combination of the Euro and German securities to compute the ex-ante credit spreads and control for the $EURO\ SLOPE$ (defined as the difference between the ten and one year Euro constant term maturity swaps complemented with similar data on German swaps for the pre-euro period) and the $1YEAR\ EURO$ (defined as the one year Euro swap rate complemented with the similar German rate for the pre-Euro period).

The results of our investigation on the ex-ante credit spreads in the U.S. bond and Eurobond markets are reported in Table 7. As before, we report both the results when we consider all bond issuers, including those issued by financial firms, and when we limit our sample to bonds of nonfinancial issuers. A quick look at our results, especially the time trend variable, reveals that once we account for the usual determinants of bond credit spreads these spreads did not change systematically over time. In particular, we find no evidence that these spreads increased over the sample period. This finding corroborate our interpretation that the decline in the gross spreads detected in both bond markets resulted in a decline in the costs of bond underwriting in these markets.

3.4 Which market became more competitive?

Given our earlier findings that the costs of bond underwriting declined in both the U.S. bond market and the Eurobond market, the natural question to ask is whether one of these markets

gained a competitive wedge during this period. Even though a quick comparison of the time trends in the U.S. and Eurobond markets shows a larger decline in the costs of bond underwriting in the latter market, this result per se does not imply that the Eurobond market became more competitive than the U.S. bond market by the end of the sample period. For one, we do not know if the difference in the time trends in the two markets is statistically significant. Further, our analysis so far says very little about the relative costs of bond underwriting in the two markets at any point in time. In addition, the difference in the decline in the underwriting costs in the two markets may be attributable solely to the underlying quality of issuers in each market. Even though in the last robustness check we considered samples of issuers that are constant over time, there may be systematic differences between the issuers in the U.S. market and those in the Eurobond market that could explain the different trends in the underwriting costs in both markets. In this subsection, we investigate the relative cost of bond underwriting in both markets over time more closely and attempt to control for these sample selection issues.

To better facilitate the comparison of underwriting costs in the U.S. bond market and the Eurobond market over time, we replace in our model of gross spreads the time trend variable with a set of time dummies. To that end, we divide the sample period in three sub periods and use three time dummies to isolate the underwriting costs in each period. This approach makes it easier to compare the costs of bond underwriting in the two markets at the beginning of the sample period and at the of the sample period. Further, to reduce concerns with sample selection bias, we consider only firms that issue in both markets. More specifically, we estimate the gross spread specification for three sample variations. The first sample includes firms that issued in *both* the U.S. bond market and the Eurobond market at least once over the sample period (1995–2006). The second sample includes only the bonds of firms that issued in *both* markets at least once during the early years of the sample period. As before, we consider for this exercise the first three years of the sample period. The final variation, further limits the sample to bonds of firms that issued in *both* markets at least once at the beginning *and* at the end of the sample period. We continue to define the beginning by the first three years of the sample period and the end by the last three years of the sample period.

Table 8 reports the results of these tests for all bond issuers, including financial issuers. Table 9 reports the same results but for the set of nonfinancial issuers. To better showcase the comparison between the two markets, the results for each market are reported side by side.

In addition, we report for each pair of models the t-test statistics comparing the difference between the time dummies in the two markets at the beginning of the sample period and at the end of the sample period. These tests give us the opportunity to compare the underwriting costs in the U.S. bond and the Eurobond market at these two points in time and ascertain which market gained a competitive wedge with the decline in the underwriting costs that we detected in the previous subsections.

Regardless of whether we consider bonds issued by all firms or focus on those offered by nonfinancial firms and irrespective of the sample we use to estimate our models of gross spreads, the results reported in Tables 8 and 9 reveal two important findings. First, at the beginning of the sample period the underwriting costs were significantly lower in the U.S. bond market than in the Eurobond market. The time dummy which identifies the underwriting costs in the first three years of the sample period (1995–1997) is systematically higher in the U.S. model of gross spreads than in the Eurobond model and their difference is statistically significant at all of the usual levels of confidence. Second, by the end of the sample period the costs of bond underwriting in the two markets had converged. A comparison of the time dummies which capture these costs in the two markets in the last three years of the sample period (2004–2006) reveals that their difference is not statistically significant.

In sum, our results demonstrate that in mid 1990s it was more expensive to issue in the Eurobond market than in the U.S. bond market. In the decade that followed, underwriting costs continued to decline in the U.S. bond market, responding to greater competition from the entry of commercial banks in the investment banking business. Despite the declining costs in United States, financial deregulation and the advent of the euro have enabled the Eurobond market to catch up and erase many the competitive advantages of the U.S. bond market. In terms of underwriting costs, by the mid 2000s the two markets became undistinguishable. These results are quite robust as they hold across different cuts of the data. These results are also robust to sample selection because firms had access to both markets and they continued to maintain their presence in both markets through out the entire sample period.

4 Have bond underwriting costs affected U.S. firms' choices?

Given the decline in the costs of bond underwriting in the Eurobond market relative to the U.S. bond market, an important question is whether this convergence in costs has in any way

affected the choice of U.S. firms of where they issue their bonds. We investigate this issue next. We first investigate if the underwriting costs of U.S. issuers follow the same patterns to those unveiled earlier based on the entire sample of firms (U.S. and non-U.S.) issuing in the U.S. and Eurobond markets. After this, we investigate if the underwriting costs in these markets have played a role in the recent migration of U.S. firms to the Eurobond market.

4.1 Underwriting costs for U.S. firms issuing in both markets

To ascertain the relative cost of issuance for U.S. firms in the Eurobond market and U.S. bond market, we identified in our sample the country of origin for each firm and isolated all U.S. issuers. Following the same approach adopted earlier to account for potential sample selection, we created three sub-samples of firms. The first sample considers only U.S. firms that issued at least once in the U.S. bond market and the Eurobond market over the sample period. The second sample, limits to U.S. firms that issued in both markets at the beginning of the sample period. The last sample imposes the additional condition that the firm must have issued in both markets not only at the beginning but also at the end of the sample period. As before, we define the beginning period by the first three years of the sample range and the end by the last three years.

We estimated gross spread specifications for these three samples of bonds issued by U.S. firms. The results of this analysis are reported in Tables 10 and 11. Table 10 again reports the results for all issuers while Table 10 focuses on non-financial issuers. No matter which table or sample we look at, our findings are very similar to those we unveiled previously based on all issuers in these markets. The time dummy variable, which captures the underwriting costs at the beginning of the sample period, is systematically and significantly higher for the Eurobond market than the U.S. bond market. In contrast, the dummy variables that control for differences in underwriting costs across the two markets at the end of the sample period are no longer statistically different from each other.

These findings are not surprising because U.S. firms dominate the set of firms that issue in both the U.S. bond market and the Eurobond market. More importantly for our purpose, however, these results confirm that while it was less expensive for U.S. firms to issue in the U.S. bond market than the Eurobond market in the mid of the 1990s, ten years later the competitive wedge of the U.S. bond market was all but gone. Has this decline in the

relative competitiveness of the U.S. bond market increased U.S. firms' incentives to issue in the Eurobond market as opposed to the U.S. bond market? We investigate this possibility in the next subsection.

4.2 U.S. firms' choice of underwriting market

There is evidence that U.S. corporate issuers are increasingly seeking to borrow in the Eurobond market.[14] The recent shift of U.S. bond issuance abroad is particularly clear among specialized financial issuers such as collateralized debt obligations. With the explosive growth of asset securitization over the last two decades, asset-backed financial issuers today represent an important segment of bond market activity. The Eurobond market has historically attracted highly rated large bank and finance issuers that accounted for roughly 75 percent of the issuance during 1995-2006. The self-regulated character of the Eurobond market is particularly suited for asset-backed securities many of which are sponsored by financial firms such as investment banks and hedge funds.

However, even if exclude from our analysis all asset-based issues, we continue to observe a rising interest to issue overseas. The share of American firms issuing domestically declined from 92 percent in 1995 to 82 percent in 2006. What are the reasons driving this gradual but significant shift in U.S. bond issuers to the Eurobond market? The ability of U.S. bond market to compete globally depends in part on the cost-benefit trade-offs offered to issuers. As discussed previously, the most direct cost shouldered by issuers is the underwriter gross spread. Our analysis has clearly shown that the disparity in gross spreads between these two competing markets has vanished in the last few years as financial disintermediation in Europe and the introduction of the euro led to a significant reduction in underwriting costs in the Eurobond market

In this section we investigate whether the recent changes in the underwriting costs in these markets has affected the choice of U.S. corporate borrowers to issue in their home market

[14]There is also evidence that European bond issuers are gradually moving back to their home market. The share of European issuers borrowing in the U.S. bond market dropped from more than 20 percent in the late 1990s to approximately 9 percent in 2006. After the introduction of the euro, the Eurobond market has technically become the home market for all European corporate borrowers. In fact, issuance by UK, French, and German companies in their traditional domestic markets, which are subject to a national authority, has almost vanished.

or overseas. We follow the two-stage methodology we outlined in section 2.1.2 to examine the decision of U.S. firms to issue domestically or in the Eurobond markets. The first stage of our methodology attempts to derive an instrument for the notional (shadow) underwriting cost faced by the issuer in the two competing markets. The shadow underwriting costs is the key explanatory variable in the second stage logistic regression that estimates the determinants of the probability of issuing in the U.S. bond or Eurobond markets. In the interest of space, we report in Table 12 only the results of the second stage.

The first column in Table 12 summarizes the baseline logistic regression model examining the choice of all U.S. firms to issue domestically or in the Eurobond market area. The different magnitudes and signs of the coefficients estimates of the credit dummy variables confirm that creditworthiness is a key determinant of the decision to issue in these competing markets. In particular, the coefficient on the dummy indicator that represents firms with credit ratings in the neighborhood of AAA is negative and statistically significant, indicating that these high-credit quality firms exhibit a greater likelihood of borrowing in the Eurobond area. In contrast, the estimates for lower levels of credit quality are positive. These results demonstrate that access to the Eurobond market is pretty much confined to highly rated U.S. companies.

The typical nonfinancial borrower in the Eurobond market during this sample period attained an A S&P rating compared to a BBB rating in the U.S. bond market. This difference in credit quality is evident in the positive and significant parameter estimate of the financial indicator variable demonstrating that U.S. nonfinancial companies face a greater cost-benefit threshold and are more likely to issue in their home market. The second and third columns in the table analyze the pattern of financing for financial and nonfinancial firms. This breakdown reveals that large and highly rated U.S. financial firms are the predominant issuers in the Eurobond market. Choudhry (2006) notes that borrowers in the Eurobond market must have a name of high recognition otherwise they need a sufficient quality credit rating to compensate for the lack of visibility.

The positive and statistically significant coefficient on the callable dummy variable indicates again that bond issues with a call feature (typically, issued by more speculative grade companies) are less likely to borrow from the Eurobond market. Not surprising, companies seeking to issue 144A bonds are more likely to do so in the U.S. market where the group of

qualified investors are most likely to reside.

The key finding of the logit regression analysis is that gross spread ratio is negatively correlated with the probability that a U.S. firm would borrow at home. As noted before, a high value gross spread ratio (between 0.5 and 1) signifies that it is cheaper for the firm to borrow in the Eurobond market. This result indicates that corporate debt issuers are sensitive to the underlying cost structure in the two markets and seek to borrow if possible in the area that provides the best pricing and terms of lending.

The magnitude of the negative coefficient on gross spread ratio is similar across financial and nonfinancial issuers (shown in the second and third column of Table 12). The fourth column in the table estimates the logit model focusing on the sample of firms that were actively issuing in the first and last three years of the sample period, eliminating many of the sample selection biases that may stem from the smaller transitory U.S. issuers that never seriously consider offering in the Eurobond area. Our results indeed show that this group of stable issuers is more responsive to gross spread disparities in the two markets. Presumably, U.S. firms that have the infrastructure in place to issue in both markets are more eager to game these underwriting costs differentials.

Internationally active companies consider the Eurobond market as a good source to hedge some of their foreign currency exposures and enhance their international profile. The last two columns in Table 12 examine the importance of the currency exposure of U.S. corporations on the decision to issue in the Eurobond market by controlling for the ratio of company sales obtained abroad. Unfortunately, Bureau van Dijk provides the breakdown of company revenues by country of origin only for nonfinancial corporations. Overall, the positive and strongly significant coefficient of the foreign sales ratio demonstrates that companies with large currency exposure and strong international presence are more likely to issue Eurobonds. Importantly, even when we control for firms' foreign exposure we continue to find that U.S. firms are sensitive to the underwriting costs in the two markets under consideration.

In the previous section we showed that in the mid-1990s bond underwriting costs were substantially higher in the Eurobond market than in the U.S. bond market, but these costs gradually converged over the last ten years as gross spreads have dramatically decreased in the Eurobond market. How did U.S. issuers respond to this decline in the cost difference between these two competing markets? Lower underwriting costs in the Eurobond area should be

particularly enticing to mid-size issuers because they make it easier for these firms to overcome the fixed costs of financing abroad.

To investigate the importance of underwriting costs in U.S. firms' market choice over time, we added to our logit regression the interaction of the gross spread ratio variable with the time dummy variables for the periods 1995-1997 and 2004-2006. The results of this test, which are available from the authors upon request, reveal that U.S. firms were much more responsive to the narrower gross spread differential in the period 2004-2006 and were more eager to borrow in the Eurobond market more recently. Moreover, consistent with our informal hypothesis, we find that smaller and less frequent issuers that did not keep a constant presence in market were particularly sensitive to cheaper financial costs in the Eurobond market and were more likely to issue abroad in 2004-2006. Interestingly, larger financial corporations with long established roots in the Eurobond market appeared to be equally responsive to gross spread differentials in both of these sub-periods. These findings are important because they lend further support to the idea that the decline in the relative competitiveness of the U.S. bond market over the last decade has been a contributing factor to the migration of the bond issuance business from the U.S. market to the Eurobond market.

5 Final remarks

In this paper, we have shown that while in the mid 1990s it was significantly less expensive to issue in the U.S. bond market than in the Eurobond market, this competitive wedge has all but disappeared in the decade that followed. Bond underwriting costs in United States came down during this period of time, but they declined at an even faster rate in the Eurobond market. Our analysis documents these findings based on samples of issuers both common to the two markets and constant over the sample period. Thus, the conversion in the underwriting costs demonstrated in this study is unlikely to be the result of a sample selection and instead represent an erosion of the competitive wedge the U.S. bond market used to enjoy over the Eurobond market. Besides showing a rise in the relative competitiveness of the Eurobnd bond market vis-á-vis the U.S. bond market, as we document in the second part of our paper, these large gains in underwriting cost efficiency achieved in the Eurobond area have contributed to the bond issuance exodus from the U.S. bond market over the last ten years.

Our findings are important because they lend support to those who have been concerned

with the competitiveness of the U.S. financial system and the corresponding implications for the role of the U.S. financial system in the international arena. Much of the recent debate on the competitive strength of the U.S. financial sector has focused on the primary and secondary equity markets – particularly, the ability of the NYSE and NASDAQ to remain the most dominant stock markets. However, our analysis reveals more disconcerting signs of deterioration in competitiveness in the global corporate bond markets. The U.S. bond market has lost a significant share to the Eurobond market, and it is no longer the undisputed home for U.S. debt issuers. In many ways, the rush of investment-grade U.S. corporations to issue in the Eurobond market is a by-product of financial globalization and liberalization trends; nevertheless, it does raise concerns for the U.S. bond market. Foremost, the growing reliance on cross-border markets by many high-quality large U.S. financial firms could undermine the credit quality of the U.S. bond market. In an extreme scenario, most high-grade U.S. companies could issue exclusively overseas, leaving the domestic bond market to be dominated by lower rated companies. This is important because a primary debt market comprised mainly of high-yield issuers would be more vulnerable to macroeconomic fluctuations and systemic risks.

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Table 1
Sample characterization[a]

Variables	All issuers			Issuers with access to both markets			U.S. issuers with access to both markets		
	U.S.	Eurobond	Difference	U.S.	Eurobond	Difference	U.S.	Eurobond	Difference
NONFINANCIAL	41.17	22.03	19.14	20.58	13.89	6.69	20.03	16.00	4.03
PUBLIC	58.04	81.32	-23.28	51.59	84.17	-32.59	55.16	84.80	-29.64
AMOUNT	315.98	229.80	86.17	366.77	263.33	103.45	363.92	267.94	95.99
MATURITY	7.50	7.27	0.23	5.89	6.06	-0.17	5.81	5.78	0.03
CCC	0.35	0.05	0.30	0.07	0.00	0.07	006	0.00	0.06
B	4.55	1.37	3.18	0.97	1.03	-0.06	0.73	0.76	-0.03
BB	3.72	1.45	2.27	1.21	1.28	-0.07	0.94	0.51	0.43
BBB	22.53	5.42	17.11	9.91	4.84	5.08	9.79	5.54	4.25
A	49.98	20.08	29.92	62.88	23.47	39.40	64.18	31.01	33.17
AA-AAA	16.92	42.47	-25.55	23.96	53.35	-29.39	24.00	55.37	-31.37
RATING MISSING	1.94	29.18	-27.23	1.00	16.04	-15.03	0.30	6.81	-6.51
RELATIONSHIP	76.24	59.16	17.08	89.06	71.04	18.02	92.01	75.10	16.90
UNDER. SHARE	8.30	3.60	4.70	8.28	3.86	4.41	8.24	4.45	3.79
UNDERWRITERS	1.28	1.39	-0.11	1.26	1.41	-0.15	1.23	1.35	-0.12
SELF MANAGED	10.85	7.34	3.51	19.49	11.15	8.34	22.57	21.60	0.97
Observations	15223	23175		8372	9011		7230	3157	

[a] $NONFINANCIAL$ dummy variable equal to 1 for nonfinancial issuers. $PUBLIC$ dummy variable equal to 1 for public issuers. $AMOUNT$ size of the bond issue. $MATURITY$ maturity of the bond. CCC, B, BB, BBB, A, and $AA-AAA$ are dummy variables which equal to 1 for bonds with these ratings. $RATING\ MISSING$ dummy variable equal to 1 for bonds for which the rating is missing. $UNDERWRITERS$ number of underwriters in the bond syndicate. $UNDERWRITER\ SHARE$ market share of the lead bond underwriter(s). $SELF\ MANAGED$ dummy variable equal to 1 for underwriters that issue debt for themselves or for one of their subsidiaries. $RELATIONSHIP$ dummy variable equal to 1 if the lead bond underwriter has also served as a loan arranger to the bond issuer over a five-year period prior to the bond offering.
Source: Authors' computations.

Table 2
Gross spreads in U.S. bond and Eurobond markets over time[a]

All issuers				
	U.S.	Eurobond	Diff	T-statistic
FIRST 3YEARS	0.827	0.935	-0.107***	6.62
(Observations)	(3528)	(8078)		
LAST 3YEARS	0.453	0.562	-0.109***	6.45
(Observations)	(2004)	(2118)		
Difference	0.375***	0.373***	0.002	
T-statistic	18.40	20.27	0.07	
All issuers with access to both markets				
	U.S.	Eurobond	Diff	T-statistic
FIRST 3YEARS	0.497	1.034	-0.536***	23.57
(Observations)	(1470)	(3.047)		
LAST 3YEARS	0.308	0.573	-0.265***	12.68
(Observations)	(1256)	(953)		
Difference	0.189***	0.461***	-0.272***	
T-statistic	10.60	16.53	7.83	
All U.S. issuers with access to both markets				
	U.S.	Eurobond	Diff	T-statistic
FIRST 3YEARS	0.440	0.992	-0.551***	20.47
(Observations)	(1227)	(994)	20.47	
LAST 3YEARS	0.309	0.628	-0.320***	12.60
(Observations)	(1168)	(433)		
Difference	0.131***	0.363***	-0.232***	
T-statistic	7.44	8.62	8.97	

[a] FIRST 3YEARS: Sample limited to the bonds of those issuers that issued at least once during the first three years of the sample period (1995-1997). LAST 3YEARS: Sample limited to the bonds of those issuers that issued at least once during the first three years *and* the last three years of the sample period (2004-2006).
Source: Authors' computations.

Table 3
Gross Spreads in U.S. bond market[a]

Variables	All corporate issuers			Nonfinancial issuers		
	1	2	3	4	5	6
L TIME TREND	-0.044**	-0.051***	-0.055***	-0.109***	-0.106***	-0.111***
	(0.021)	(0.018)	(0.017)	(0.020)	(0.018)	(0.018)
NONFINANCIAL	0.043	0.052	0.054			
	(0.082)	(0.082)	(0.082)			
PUBLIC	0.045*	0.036	0.036	-0.064**	-0.062**	-0.062**
	(0.026)	(0.025)	(0.025)	(0.028)	(0.028)	(0.027)
L AMOUNT	-0.050***	-0.053***	-0.052***	-0.038***	-0.034**	-0.034**
	(0.013)	(0.014)	(0.014)	(0.014)	(0.015)	(0.015)
MATURITY	0.020***	0.020***	0.020***	0.012***	0.012***	0.012***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
CCC	0.884***	0.895***	0.897***	0.501***	0.507***	0.506***
	(0.134)	(0.133)	(0.133)	(0.147)	(0.145)	(0.145)
B	0.866***	0.864***	0.864***	0.488***	0.481***	0.478***
	(0.098)	(0.097)	(0.097)	(0.111)	(0.110)	(0.110)
BB	0.105	0.115	0.112	-0.268**	-0.263**	-0.267**
	(0.110)	(0.111)	(0.110)	(0.124)	(0.123)	(0.123)
BBB	-0.745***	-0.727***	-0.730***	-1.099***	-1.086***	-1.092***
	(0.093)	(0.092)	(0.092)	(0.111)	(0.110)	(0.110)
A	-0.754***	-0.734***	-0.738***	-1.127***	-1.110***	-1.116***
	(0.097)	(0.097)	(0.096)	(0.112)	(0.111)	(0.111)
AA-AAA	-0.795***	-0.775***	-0.778***	-1.076***	-1.068***	-1.074***
	(0.095)	(0.095)	(0.095)	(0.122)	(0.120)	(0.119)
SENIOR	-0.170***	-0.163***	-0.162***	-0.207***	-0.204***	-0.203***
	(0.045)	(0.045)	(0.045)	(0.051)	(0.051)	(0.051)
SINKING FUND	-0.045	-0.050*	-0.045*	0.015	0.008	0.013
	(0.028)	(0.028)	(0.027)	(0.033)	(0.033)	(0.032)
CALLABLE	0.304***	0.299***	0.299***	0.238***	0.232***	0.231***
	(0.036)	(0.036)	(0.036)	(0.027)	(0.027)	(0.027)
RULE 144A	0.120***	0.118***	0.116***	0.157***	0.146***	0.145***
	(0.027)	(0.028)	(0.028)	(0.027)	(0.027)	(0.027)
RELATIONSHIP		-0.049***	-0.048***		-0.040**	-0.040**
		(0.014)	(0.015)		(0.016)	(0.016)
UNDERWRITER SHARE		-0.397***	-0.414***		-0.544**	-0.558**
		(0.145)	(0.146)		(0.241)	(0.233)
UNDERWRITERS		0.02	0.023		-0.005	-0.002
		(0.014)	(0.014)		(0.016)	(0.017)
SELF MANAGED		0.075*	0.074*			
		(0.043)	(0.042)			
RECESSION			0.050*			0.046
			(0.029)			(0.044)
CONSTANT	1.326***	1.363***	1.375***	2.041***	2.084***	1.994***
	(0.137)	(0.135)	(0.149)	(0.206)	(0.207)	(0.224)
Observations	15223	15223	15223	6268	6268	6268
R-squared	0.62	0.62	0.62	0.7	0.7	0.7

[a] Models estimated with robust standard errors and clustered by firm to correct for correlation across observations of a given firm. $LTIMETREND$: is the log of time trend. $SENIOR$: dummy variable equal to 1 for senior subordinated bonds. $SINKFUND$: dummy variable equal to 1 for bonds that have a sinking fund. $CALLABLE$: dummy variable equal to 1 for callable bonds. $RULE\ 144A$: dummy variable equal to 1 for bonds issued under Rule 144A. $MATURITY$: maturity of the bond. $LAMOUNT$: log of the issue amount. $NONFINANCIAL$: dummy variable equal to 1 for bonds issued by nonfinancials. $PUBLIC$: dummy variable equal to 1 for bonds issued by public firms. $UNDERWRITERS$: number of lead underwriters in the bond syndicate. $UNDERWRITER\ SHARE$: market share of the underwriter(s). CCC, B, $\cdots$ $AA-AAA$ set of dummy variables for bonds with the corresponding credit rating. $SELF\ MANAGED$: dummy variable equal to 1 when the underwriter issues debt for itself or for one of its subsidiaries. $RELATIONSHIP$: dummy variable equal to 1 when the bond underwriter has also served as a loan arranger to the issuing firm over a five-year period prior to the bond offering. $RECESSION$: dummy variable equal to 1 if the bond was issued during the 2001 recession. Included in the regressions but not shown in the table are (i) a dummy variable to account for the bonds with a missing rating, (ii) dummy variables to account for the currency of the issue, and

(iii) dummy variables to account for the sector of activity of the issuer.
Source: Authors' computations.

Table 4
Gross Spreads in U.S. bond market: Further results[a]

Variables	All corporate issuers			Nonfinancial issuers		
	All Years	F3Years	F-L3Years	All Years	F3Years	F-L3Years
L TIME TREND	-0.014*	-0.018**	-0.019**	-0.048***	-0.047***	-0.056***
	(0.008)	(0.008)	(0.009)	(0.015)	(0.015)	(0.018)
NONFINANCIAL	0.154	0.256	0.606			
	(0.111)	(0.167)	(0.439)			
PUBLIC	0.031*	0.033*	0.03	-0.002	0.009	-0.015
	(0.018)	(0.019)	(0.022)	(0.038)	(0.041)	(0.047)
L AMOUNT	-0.053***	-0.052***	-0.054***	-0.037***	-0.022***	-0.01
	(0.003)	(0.003)	(0.004)	(0.006)	(0.007)	(0.008)
MATURITY	0.020***	0.021***	0.026***	0.014***	0.011***	0.014***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
CCC	0.828***	0.712**	0.899*	0.801***	0.691*	1.193**
	(0.264)	(0.319)	(0.486)	(0.286)	(0.354)	(0.517)
B	0.736***	0.762***	0.936***	0.681***	0.771***	1.227***
	(0.101)	(0.118)	(0.141)	(0.158)	(0.185)	(0.146)
BB	0.439***	0.379***	0.572***	0.457***	0.440***	0.896***
	(0.082)	(0.101)	(0.110)	(0.139)	(0.167)	(0.102)
BBB	-0.175***	-0.236***	-0.067	-0.212*	-0.229	0.143**
	(0.058)	(0.078)	(0.089)	(0.119)	(0.143)	(0.059)
A	-0.173***	-0.230***	-0.082	-0.232*	-0.259*	0.091
	(0.057)	(0.076)	(0.089)	(0.120)	(0.143)	(0.059)
AA-AAA	-0.185***	-0.268***	-0.096	-0.107	-0.192	0.162**
	(0.056)	(0.077)	(0.090)	(0.127)	(0.149)	(0.072)
SENIOR	-0.161***	-0.148***	-0.059	-0.392***	-0.358***	-0.287**
	(0.033)	(0.035)	(0.046)	(0.080)	(0.096)	(0.136)
SINKING FUND	-0.032**	-0.033*	-0.028	0.022	0.041	0.054
	(0.015)	(0.018)	(0.018)	(0.026)	(0.033)	(0.034)
CALLABLE	0.264***	0.281***	0.284***	0.158***	0.132***	0.091***
	(0.016)	(0.018)	(0.021)	(0.019)	(0.020)	(0.022)
RULE 144A	0.120***	0.125***	0.151***	0.081**	0.069*	0.098**
	(0.024)	(0.029)	(0.036)	(0.033)	(0.039)	(0.047)
RELATIONSHIP	0.009	0.014	0.036**	0.003	0.005	0.011
	(0.011)	(0.012)	(0.017)	(0.014)	(0.017)	(0.023)
UNDERWRITER SHARE	-0.221***	-0.277***	-0.262***	-0.227*	-0.437***	0.018
	(0.080)	(0.084)	(0.100)	(0.128)	(0.136)	(0.174)
UNDERWRITERS	0.045***	0.052***	0.050***	0.030**	0.019	0.019
	(0.008)	(0.009)	(0.009)	(0.012)	(0.014)	(0.015)
SELF MANAGED	0.029	0.031	0.068			
	(0.041)	(0.049)	(0.057)			
RECESSION	0.032**	0.017	0.025	0.068***	0.017	0.014
	(0.013)	(0.016)	(0.016)	(0.022)	(0.026)	(0.030)
CONSTANT	0.674***	0.848***	0.639***	1.140***	1.483***	0.707***
	(0.111)	(0.108)	(0.150)	(0.242)	(0.279)	(0.260)
Observations	15223	11975	7694	6268	4344	2227
Number of issuers id	2522	1505	398	1803	1059	274
R-squared	0.27	0.28	0.31	0.27	0.27	0.3

[a] Models estimated with robust standard errors and firm fixed effects. All years: Sample includes the bonds of all issuers during the sample period (1995–2006). F3Years: Sample limited to the bonds of those issuers that issued at least once during the first three years of the sample period. F-L3Years: Sample limited to the bonds of those issuers that issued at least once during the first three years *and* the last three years of the sample period. $L\,TIME\,TREND$: is the log of time trend. $SENIOR$: dummy variable equal to 1 for senior subordinated bonds. $SINK\,FUND$: dummy variable equal to 1 for bonds that have a sinking fund. $CALLABLE$: dummy variable equal to 1 for callable bonds. $RULE\ 144A$: dummy variable equal to 1 for bonds issued under Rule 144A. $MATURITY$: maturity of the bond. $L\,AMOUNT$: log of the issue amount. $NONFINANCIAL$: dummy variable equal to 1 for bonds issued by nonfinancials. $PUBLIC$: dummy variable equal to 1 for bonds issued by public firms. $UNDERWRITERS$: number of lead underwriters in the bond syndicate. $UNDERWRITER\,SHARE$: market share of the underwriter(s). CCC, B, $\cdots$ $AA-AAA$ set of dummy variables for bonds with the corresponding credit rating. $SELF\,MANAGED$: dummy variable equal to 1 when the underwriter issues debt for itself or for one of its subsidiaries. $RELATIONSHIP$: dummy

variable equal to 1 when the bond underwriter has also served as a loan arranger to the issuing firm over a five-year period prior to the bond offering. $RECESSION$: dummy variable equal to 1 if the bond was issued during the 2001 recession. Included in the regressions but not shown in the table are (i) a dummy variable to account for the bonds with a missing rating, (ii) dummy variables to account for the currency of the issue, and (iii) dummy variables to account for the sector of activity of the issuer.
Source: Authors' computations.

Table 5
Gross Spreads in the Eurobond market[a]

Variables	All corporate issuers			Nonfinancial issuers		
	1	2	3	4	5	6
L TIME TREND	-0.323***	-0.314***	-0.224***	-0.381***	-0.352***	-0.280***
	(0.022)	(0.023)	(0.016)	(0.036)	(0.038)	(0.029)
NONFINANCIAL	0.232***	0.263***	0.273***			
	(0.066)	(0.067)	(0.058)			
PUBLIC	0.425***	0.429***	0.101***	0.231***	0.232***	0.079**
	(0.037)	(0.037)	(0.026)	(0.053)	(0.051)	(0.038)
L AMOUNT	-0.025**	-0.005	0.025***	0.088***	0.101***	0.100***
	(0.011)	(0.011)	(0.008)	(0.016)	(0.016)	(0.015)
MATURITY	0.002*	0.004***	0.007***	-0.001	-0.001	0.003
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
CCC	1.042**	1.042**	0.991**	0.880	0.838	0.807
	(0.433)	(0.441)	(0.409)	(0.568)	(0.573)	(0.548)
B	1.000***	1.041***	0.992***	1.186***	1.135***	1.095***
	(0.088)	(0.089)	(0.084)	(0.092)	(0.092)	(0.091)
BB	0.391***	0.423***	0.407***	0.446***	0.414***	0.368***
	(0.062)	(0.063)	(0.064)	(0.100)	(0.098)	(0.103)
BBB	-0.093***	-0.063**	-0.041*	-0.240***	-0.225***	-0.237***
	(0.031)	(0.031)	(0.024)	(0.046)	(0.046)	(0.041)
A	-0.129***	-0.140***	-0.129***	-0.191***	-0.192***	-0.193***
	(0.032)	(0.033)	(0.024)	(0.047)	(0.048)	(0.041)
AA-AAA	0.195***	0.181***	0.058**	0.096*	0.087	-0.031
	(0.039)	(0.036)	(0.026)	(0.056)	(0.057)	(0.047)
CALLABLE	-0.164***	-0.178***	-0.065***	0.100**	0.104**	0.122***
	(0.024)	(0.024)	(0.020)	(0.046)	(0.044)	(0.038)
RELATIONSHIP		0.103***	0.114***		-0.069**	0.017
		(0.020)	(0.016)		(0.029)	(0.025)
UNDERWRITER SHARE		-2.343***	-1.549***		0.357	0.622
		(0.317)	(0.249)		(0.511)	(0.441)
UNDERWRITERS		-0.033***	-0.019***		-0.087***	-0.072***
		(0.007)	(0.006)		(0.017)	(0.016)
SELF MANAGED		0.144**	0.117***			
		(0.057)	(0.045)			
CONSTANT	1.107***	1.072***	1.617***	0.745***	0.798***	1.351***
	(0.081)	(0.081)	(0.072)	(0.103)	(0.097)	(0.092)
Observations	23175	23175	23175	5106	5106	5106
R-squared	0.18	0.2	0.37	0.28	0.29	0.41

[a] Models estimated with robust standard errors and clustered by firm to correct for correlation across observations of a given firm. $L\,TIME\,TREND$: is the log of time trend. $CALLABLE$: dummy variable equal to 1 for callable bonds. $MATURITY$: maturity of the bond. $L\,AMOUNT$: log of the issue amount. $NONFINANCIAL$: dummy variable equal to 1 for bonds issued by nonfinancials. $PUBLIC$: dummy variable equal to 1 for bonds issued by public firms. $UNDERWRITERS$: number of lead underwriters in the bond syndicate. $UNDERWRITER\,SHARE$: market share of the underwriter(s). CCC, B, $\cdots$ $AA-AAA$ set of dummy variables for bonds with the corresponding credit rating. $SELF\,MANAGED$: dummy variable equal to 1 when the underwriter issues debt for itself or for one of its subsidiaries. $RELATIONSHIP$: dummy variable equal to 1 when the bond underwriter has also served as a loan arranger to the issuing firm over a five-year period prior to the bond offering. Included in the regressions but not shown in the table are (i) a dummy variable to account for the bonds with a missing rating, (ii) dummy variables to account for the currency of the issue, and (iii) dummy variables to account for the sector of activity of the issuer.
Source: Authors' computations.

Table 6
Gross Spreads in the Eurobond market: Further results[a]

Variables	All corporate issuers			Nonfinancial issuers		
	All Years	F3Years	F-L3Years	All Years	F3Years	F-L3Years
L TIME TREND	-0.200***	-0.193***	-0.228***	-0.311***	-0.301***	-0.409***
	(0.009)	(0.009)	(0.011)	(0.025)	(0.026)	(0.034)
NONFINANCIAL	0.322*	0.269	0.131***			
	(0.166)	(0.365)	(0.032)			
PUBLIC	0.115***	0.116***	0.139***	0.02	0.005	0.015
	(0.015)	(0.017)	(0.022)	(0.036)	(0.040)	(0.063)
L AMOUNT	-0.002	0.022***	0.011	0.049***	0.081***	0.063***
	(0.005)	(0.006)	(0.007)	(0.013)	(0.017)	(0.022)
MATURITY	0.012***	0.014***	0.019***	0.005**	0	0.001
	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)
CCC	-0.555	0	0	-1.078	0	0
	(0.456)	0.000	0.000	(0.694)	0.000	0.000
B	0.235***	0.138	0.141	0.217	0.084	-0.277
	(0.070)	(0.085)	(0.087)	(0.158)	(0.237)	(0.251)
BB	0.306***	0.129**	0.077	0.16	0.256**	0.362**
	(0.056)	(0.062)	(0.073)	(0.109)	(0.126)	(0.177)
BBB	0.027	-0.056*	-0.047	-0.058	-0.005	0.015
	(0.023)	(0.031)	(0.043)	(0.057)	(0.082)	(0.102)
A	-0.053***	-0.081***	-0.086***	-0.062	-0.101*	-0.072
	(0.016)	(0.020)	(0.025)	(0.047)	(0.054)	(0.067)
AA-AAA	-0.040***	-0.020	-0.002	0.048	0.087	0.025
	(0.015)	(0.017)	(0.021)	(0.049)	(0.055)	(0.064)
CALLABLE	-0.076***	-0.093***	-0.152***	-0.015	-0.032	-0.129
	(0.013)	(0.014)	(0.022)	(0.027)	(0.027)	(0.084)
RELATIONSHIP	0.068***	0.087***	0.105***	0.061***	0.106***	0.171***
	(0.009)	(0.011)	(0.016)	(0.021)	(0.028)	(0.040)
UNDERWRITER SHARE	-1.044***	-1.573***	-1.623***	-0.112	-0.783	-1.343**
	(0.165)	(0.209)	(0.240)	(0.424)	(0.581)	(0.674)
UNDERWRITERS	0.009**	0.011	0.012*	-0.008	-0.028	-0.013
	(0.004)	(0.007)	(0.007)	(0.017)	(0.027)	(0.029)
SELF MANAGED	0.162***	0.109***	0.202***			
	(0.033)	(0.034)	(0.040)			
CONSTANT	1.596***	1.458***	1.131***	0.814*	0.823**	1.441***
	(0.165)	(0.359)	(0.053)	(0.492)	(0.350)	(0.161)
Observations	23175	15908	8801	5106	3052	1153
Number of issuers id	3587	1693	333	1668	781	126
R-squared	0.23	0.26	0.28	0.24	0.28	0.37

[a] Models estimated with robust standard errors and firm fixed effects. All years: Sample includes the bonds of all issuers during the sample period (1995–2006). F3Years: Sample limited to the bonds of those issuers that issued at least once during the first three years of the sample period. F-L3Years: Sample limited to the bonds of those issuers that issued at least once during the first three years *and* the last three years of the sample period. $LTIMETREND$: is the log of time trend. $CALLABLE$: dummy variable equal to 1 for callable bonds. $MATURITY$: maturity of the bond. $LAMOUNT$: log of the issue amount. $NONFINANCIAL$: dummy variable equal to 1 for bonds issued by nonfinancials. $PUBLIC$: dummy variable equal to 1 for bonds issued by public firms. $UNDERWRITERS$: number of lead underwriters in the bond syndicate. $UNDERWRITER\ SHARE$: market share of the underwriter(s). CCC, B, $\cdots$ $AA-AAA$ set of dummy variables for bonds with the corresponding credit rating. $SELF\ MANAGED$: dummy variable equal to 1 when the underwriter issues debt for itself or for one of its subsidiaries. $RELATIONSHIP$: dummy variable equal to 1 when the bond underwriter has also served as a loan arranger to the issuing firm over a five-year period prior to the bond offering. Included in the regressions but not shown in the table are (i) a dummy variable to account for the bonds with a missing rating, (ii) dummy variables to account for the currency of the issue, and (iii) dummy variables to account for the sector of activity of the issuer.
Source: Authors' computations.

Table 7
Ex ante credit spreads in the U.S. bond market and the Eurobond market[a]

Variables	U.S. bond market		Eurobond market			
	1	2	3	4	5	6
	All	Nonfin	All	Nonfin	All	Nonfin
L TIME TREND	0.033	-0.046	0.011	-0.08	0.06	-0.048
	(0.033)	(0.047)	(0.083)	(0.118)	(0.116)	(0.194)
NONFINANCIAL	0.202		0.767***		0.805***	
	(0.165)		(0.114)		(0.118)	
PUBLIC	-0.062	-0.204***	-0.022	0.041	-0.114*	-0.063
	(0.051)	(0.047)	(0.065)	(0.114)	(0.067)	(0.126)
LAMOUNT	-0.005	-0.048**	-0.143***	-0.109***	-0.123***	-0.109**
	(0.013)	(0.020)	(0.028)	(0.042)	(0.03)	(0.044)
MATURITY	-0.006***	-0.015***	0.009***	0.006	0.009***	0.005
	(0.001)	(0.002)	(0.003)	(0.005)	(0.003)	(0.006)
CCC	2.714***	2.200***	4.358***	4.230***	4.232***	4.158***
	(0.179)	(0.178)	(0.212)	(0.245)	(0.204)	(0.242)
B	1.601***	1.099***	3.412***	3.305***	3.415***	3.327***
	(0.126)	(0.125)	(0.129)	(0.165)	(0.137)	(0.182)
BB	0.164	-0.232*	1.913***	1.841***	1.852***	1.817***
	(0.134)	(0.136)	(0.132)	(0.155)	(0.135)	(0.172)
BBB	-1.196***	-1.486***	0.095	-0.208*	0.105	-0.183
	(0.106)	(0.107)	(0.084)	(0.123)	(0.088)	(0.138)
A	-1.595***	-1.875***	-0.540***	-0.905***	-0.509***	-0.924***
	(0.111)	(0.109)	(0.062)	(0.108)	(0.064)	(0.127)
AA-AAA	-1.994***	-2.206***	-0.761***	-1.266***	-0.710***	-1.365***
	(0.112)	(0.131)	(0.069)	(0.112)	(0.070)	(0.132)
CALLABLE	0.402***	0.551***	0.170***	0.237**	0.169***	0.158
	(0.038)	(0.046)	(0.065)	(0.113)	(0.065)	(0.123)
SENIOR	0.052	0.168**				
	(0.057)	(0.073)				
SINKING FUND	-0.105	-0.049				
	(0.091)	(0.078)				
RULE 144A	0.482***	0.837***				
	(0.063)	(0.059)				
RELATIONSHIP	-0.212***	-0.160***	-0.258***	-0.139***	-0.267***	-0.187***
	(0.036)	(0.039)	(0.035)	(0.05)	(0.037)	(0.054)
UNDERWRITER SHARE	-0.575	-0.071	1.516***	1.669*	1.413***	0.874
	(0.378)	(0.403)	(0.485)	(0.856)	(0.46)	(0.874)
UNDERWRITERS	-0.080***	-0.094***	-0.019*	-0.069**	-0.016	-0.039
	(0.024)	(0.032)	(0.011)	(0.032)	(0.011)	(0.033)
SELF MANAGED	0.13		0.316*		0.317*	
	(0.097)		(0.134)		(0.139)	
RECESSION	0.447***	0.511***				
	(0.053)	(0.062)				
TREASURY SLOPE	-0.184***	-0.164***	-0.189***	-0.099		
	(0.028)	(0.04)	(0.047)	(0.069)		
1YEAR TREASURY	-0.137***	-0.126***	-0.184***	-0.166**		
	(0.03)	(0.033)	(0.035)	(0.053)		
EURO SLOPE					0.016	0.125
					(0.05)	(0.086)
1YEAR EURO					-0.013	0.048
					(0.032)	(0.058)
CONSTANT	1.455***	2.702***	3.159***	2.445***	2.164***	1.567**
	(0.458)	(0.668)	(0.395)	(0.549)	(0.451)	(0.753)
Observations	16832	9369	13478	3990	12104	3529
R-squared	0.64	0.64	0.51	0.64	0.54	0.66

[a] Models estimated with robust standard errors and clustered by firm to correct for correlation across observations of a given firm. $LTIMETREND$: is the log of time trend. $SENIOR$: dummy variable equal to 1 for senior subordinated bonds. $SINKFUND$: dummy variable equal to 1 for bonds that have a sinking fund. $CALLABLE$: dummy variable equal to 1 for callable bonds. $RULE\ 144A$: dummy variable equal to 1 for bonds issued under Rule 144A. $MATURITY$: maturity of the bond. $LAMOUNT$: log of the issue amount.

$NONFINANCIAL$: dummy variable equal to 1 for bonds issued by nonfinancials. $PUBLIC$: dummy variable equal to 1 for bonds issued by public firms. $UNDERWRITERS$: number of lead underwriters in the bond syndicate. $UNDERWRITER\,SHARE$: market share of the underwriter(s). CCC, B, $\cdots$ $AA - AAA$ set of dummy variables for bonds with the corresponding credit rating. $SELF\,MANAGED$: dummy variable equal to 1 when the underwriter issues debt for itself or for one of its subsidiaries. $RELATIONSHIP$: dummy variable equal to 1 when the bond underwriter has also served as a loan arranger to the issuing firm over a five-year period prior to the bond offering. $TREASURY\,SLOPE$ difference between the yields of constant maturity Treasuries with 10 and 1 years. $1YEAR\,TREASURY$ yield on the 1 year Treasury with constant maturity. $EURO\,SLOPE$ difference between the 10 and 1 year Euro constant maturity swaps. We complemented these yields for the period prior to the Euro with data from Germany. $1YEAR\,EURO$ as the Euro 1 year swap rate again complemented with data from Germany for the period prior to the Euro. Included in the regressions but not shown in the table are (i) a dummy variable to account for the bonds with a missing rating, (ii) dummy variables to account for the currency of the issue, and (iii) dummy variables to account for the sector of activity of the issuer.
Source: Authors' computations.

Table 8
Gross spreads in the U.S. bond and Eurobond markets for firms that issue in both markets[a]

Variables	All years		F3YEARS		F-L3YEARS	
	U.S.	EU	U.S.	EU	U.S.	EU
FIRST 3YEARS	-0.013	0.277***	-0.007	0.276***	-0.027*	0.306***
	(0.014)	(0.018)	(0.014)	(0.018)	(0.016)	(0.022)
LAST 3YEARS	-0.049***	-0.070***	-0.050***	-0.085***	-0.060***	-0.075**
	(0.014)	(0.023)	(0.016)	(0.030)	(0.016)	(0.030)
NONFINANCIAL	0.104*	0.638**	0.128**	0.549	-0.191	0.202***
	(0.057)	(0.305)	(0.058)	(0.436)	(0.341)	(0.043)
PUBLIC	0.038*	0.196***	0.032	0.186***	0.013	0.200***
	(0.022)	(0.022)	(0.022)	(0.024)	(0.026)	(0.029)
L AMOUNT	-0.053***	0.008	-0.053***	0.017**	-0.053***	0.006
	(0.004)	(0.007)	(0.004)	(0.008)	(0.004)	(0.009)
MATURITY	0.031***	0.023***	0.031***	0.024***	0.036***	0.028***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
CCC	0.340	0	0.195	0	0.378	0
	(0.415)	0.000	(0.483)	0.000	(0.773)	0.000
B	1.002***	0.322***	0.980***	0.348**	1.046***	0.233*
	(0.174)	(0.117)	(0.195)	(0.137)	(0.200)	(0.131)
BB	0.500***	0.089	0.489***	0.085	0.563***	0.074
	(0.131)	(0.076)	(0.166)	(0.083)	(0.163)	(0.091)
BBB	0.069	-0.152***	0.070	-0.190***	0.158	-0.225***
	(0.070)	(0.040)	(0.101)	(0.047)	(0.108)	(0.062)
A	0.052	-0.108***	0.046	-0.141***	0.142	-0.142***
	(0.066)	(0.026)	(0.097)	(0.029)	(0.107)	(0.034)
AA-AAA	-0.031	-0.018	-0.045	-0.025	0.075	0.009
	(0.065)	(0.022)	(0.097)	(0.024)	(0.109)	(0.029)
CALLABLE	0.339***	-0.144***	0.350***	-0.154***	0.333***	-0.229***
	(0.026)	(0.022)	(0.028)	(0.023)	(0.033)	(0.030)
SENIOR	-0.005		-0.014		0.062	
	(0.040)		(0.044)		(0.054)	
SINKING FUND	-0.077***		-0.069***		-0.060**	
	(0.021)		(0.024)		(0.024)	
RULE 144A	0.094***		0.124***		0.103**	
	(0.033)		(0.043)		(0.053)	
RELATIONSHIP	0.054***	0.057***	0.066***	0.083***	0.084***	0.096***
	(0.018)	(0.015)	(0.022)	(0.017)	(0.030)	(0.022)
UNDERWRITER SHARE	-0.191**	-1.054***	-0.253**	-1.409***	-0.260**	-1.415***
	(0.095)	(0.244)	(0.103)	(0.286)	(0.116)	(0.318)
UNDERWRITERS	0.055***	0.003	0.072***	0.008	0.073***	0.009
	(0.009)	(0.005)	(0.010)	(0.008)	(0.010)	(0.009)
SELF MANAGED	0.04	0.136***	0.045	0.075*	0.087	0.184***
	(0.037)	(0.043)	(0.045)	(0.044)	(0.054)	(0.052)
RECESSION	0.044***		0.029		0.022	
	(0.016)		(0.018)		(0.019)	
CONSTANT	0.107	1.385***	0.325*	1.303***	0.041	0.935***
	(0.211)	(0.295)	(0.198)	(0.422)	(0.358)	(0.068)
Observations	8372	9011	7022	7213	5425	5114
Number of issuers	559	669	333	343	128	130
R-squared	0.35	0.27	0.35	0.29	0.38	0.3
EU first-years	0.277		0.276		0.306	
U.S. first-years	-0.013		-0.007		-0.027	
T-tests	12.59***		12.37***		12.34***	
EU Last years	-0.07		-0.085		-0.075	
U.S. Last years	-0.049		-0.05		-0.06	
T-tests	-0.77		-1.02		-0.45	

[a] Models estimated with robust standard errors and firm fixed effects. All years: Sample includes the bonds of all issuers (that issued in both markets) during the sample period (1995–2006). F3Years: Sample limited to the bonds of those issuers that issued at least once during the first three years of the sample period in both markets. F-L3Years: Sample limited to the bonds of those issuers that issued at least once during the first three years *and* the last three years of the sample period in both markets. $FIRST\ 3YEARS$: Dummy

variable equal to 1 for bonds issued during the first years of the sample period. $LAST\ 3YEARS$: Dummy variable equal to 1 for bonds issued during the last years of the sample period. $L\ TIME\ TREND$: is the log of time trend. $SENIOR$: dummy variable equal to 1 for senior subordinated bonds. $SINK\ FUND$: dummy variable equal to 1 for bonds that have a sinking fund. $CALLABLE$: dummy variable equal to 1 for callable bonds. $RULE\ 144A$: dummy variable equal to 1 for bonds issued under Rule 144A. $MATURITY$: maturity of the bond. $L\ AMOUNT$: log of the issue amount. $NONFINANCIAL$: dummy variable equal to 1 for bonds issued by nonfinancials. $PUBLIC$: dummy variable equal to 1 for bonds issued by public firms. $UNDERWRITERS$: number of lead underwriters in the bond syndicate. $UNDERWRITER\ SHARE$: market share of the underwriter(s). CCC, B, $\cdots$ $AA - AAA$ set of dummy variables for bonds with the corresponding credit rating. $SELF\ MANAGED$: dummy variable equal to 1 when the underwriter issues debt for itself or for one of its subsidiaries. $RELATIONSHIP$: dummy variable equal to 1 when the bond underwriter has also served as a loan arranger to the issuing firm over a five-year period prior to the bond offering. $RECESSION$: dummy variable equal to 1 if the bond was issued during the 2001 recession. Included in the regressions but not shown in the table are (i) a dummy variable to account for the bonds with a missing rating, (ii) dummy variables to account for the currency of the issue, and (iii) dummy variables to account for the sector of activity of the issuer.
Source: Authors' computations.

Table 9
Gross spreads in the U.S. bond and Eurobond markets for nonfinancial firms that issue in both markets[a]

Variables	All years		F3Years		F-L3Years	
	U.S.	EU	U.S.	EU	U.S.	EU
FIRST 3YEARS	0.012	0.530***	0.003	0.583***	0.008	0.747***
	(0.025)	(0.068)	(0.023)	(0.069)	(0.028)	(0.097)
LAST 3YEARS	-0.014	-0.069	0.022	-0.136	0.017	-0.101
	(0.040)	(0.076)	(0.057)	(0.109)	(0.056)	(0.094)
PUBLIC	0.164**	0.135*	0.135**	0.099	0.077	0.091
	(0.068)	(0.080)	(0.056)	(0.103)	(0.057)	(0.105)
L AMOUNT	-0.067***	0.067**	-0.055***	0.126***	-0.052***	0.012
	(0.007)	(0.029)	(0.010)	(0.035)	(0.010)	(0.043)
MATURITY	0.014***	0.012***	0.011***	0.011***	0.016***	0.010***
	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)
CCC	0.271	0	0.005	0	-0.102	0
	(0.397)	0.000	(0.398)	0.000	(0.618)	0.000
B	1.466***	0.352	1.795***	0.480*	1.788***	0.511**
	(0.280)	(0.225)	(0.328)	(0.278)	(0.213)	(0.213)
BB	0.797***	0.159	1.008***	0.353	1.242***	0.925***
	(0.258)	(0.188)	(0.324)	(0.253)	(0.178)	(0.338)
BBB	0.118	-0.070	0.216	0.161	0.122	0.100
	(0.217)	(0.107)	(0.286)	(0.183)	(0.104)	(0.252)
A	0.076	-0.077	0.128	-0.121	-0.051	-0.110
	(0.219)	(0.087)	(0.287)	(0.106)	(0.117)	(0.114)
AA-AAA	0.075	0.101	0.114	0.091	-0.056	0.059
	(0.219)	(0.080)	(0.287)	(0.091)	(0.118)	(0.093)
CALLABLE	0.172***	-0.200**	0.064**	-0.244*	0.038	-0.562***
	(0.032)	(0.087)	(0.029)	(0.128)	(0.034)	(0.169)
SENIOR	-0.581***		-0.764***		-0.836***	
	(0.199)		(0.285)		(0.290)	
SINKING FUND	0.008		0.082		0.102	
	(0.047)		(0.067)		(0.073)	
RULE 144A	0.047		-0.001		-0.022	
	(0.043)		(0.053)		(0.073)	
RELATIONSHIP	0.03	0.004	0.041	0.032	0.045	0.096
	(0.023)	(0.043)	(0.027)	(0.058)	(0.036)	(0.068)
UNDERWRITER SHARE	0.032	0.214	-0.16	-0.083	0.011	0.036
	(0.208)	(0.756)	(0.251)	(0.993)	(0.293)	(1.034)
UNDERWRITERS	0.039**	-0.024	0.022	-0.072*	0.022	-0.018
	(0.016)	(0.027)	(0.019)	(0.042)	(0.021)	(0.048)
RECESSION	0.142***		0.084**		0.087**	
	(0.033)		(0.034)		(0.041)	
CONSTANT	1.019**	0.949***	0.505	0.629***	2.332***	0.968***
	(0.412)	(0.176)	(0.431)	(0.209)	(0.359)	(0.239)
Observations	1723	1252	1151	749	743	380
Number of issuers id	300	328	177	145	68	45
R-squared	0.34	0.36	0.39	0.41	0.45	0.54

EU first-years	0.53	0.583	0.747
U.S. first-years	0.012	0.003	0.008
T-tests	7.97***	9.28***	9.28***
EU Last years	-0.069	-0.136	-0.101
U.S. Last years	-0.014	0.022	0.017
T-tests	-0.69	-1.40	-1.14

[a] Models estimated with robust standard errors and firm fixed effects. All years: Sample includes the bonds of all issuers (that issued in both markets) during the sample period (1995–2006). F3Years: Sample limited to the bonds of those issuers that issued at least once during the first three years of the sample period in both markets. F-L3Years: Sample limited to the bonds of those issuers that issued at least once during the first three years *and* the last three years of the sample period in both markets. $FIRST\ 3YEARS$: Dummy variable equal to 1 for bonds issued during the first years of the sample period. $LAST\ 3YEARS$: Dummy variable equal to 1 for bonds issued during the last years of the sample period. $L\ TIME\ TREND$: is the log of time trend. $SENIOR$: dummy variable equal to 1 for senior subordinated bonds. $SINK\ FUND$:

dummy variable equal to 1 for bonds that have a sinking fund. $CALLABLE$: dummy variable equal to 1 for callable bonds. $RULE\ 144A$: dummy variable equal to 1 for bonds issued under Rule 144A. $MATURITY$: maturity of the bond. $L\ AMOUNT$: log of the issue amount. $PUBLIC$: dummy variable equal to 1 for bonds issued by public firms. $UNDERWRITERS$: number of lead underwriters in the bond syndicate. $UNDERWRITER\ SHARE$: market share of the underwriter(s). CCC, B, $\cdots$ $AA - AAA$ set of dummy variables for bonds with the corresponding credit rating. $SELF\ MANAGED$: dummy variable equal to 1 when the underwriter issues debt for itself or for one of its subsidiaries. $RELATIONSHIP$: dummy variable equal to 1 when the bond underwriter has also served as a loan arranger to the issuing firm over a five-year period prior to the bond offering. $RECESSION$: dummy variable equal to 1 if the bond was issued during the 2001 recession. Included in the regressions but not shown in the table are (i) a dummy variable to account for the bonds with a missing rating, (ii) dummy variables to account for the currency of the issue, and (iii) dummy variables to account for the sector of activity of the issuer.
Source: Authors' computations.

Table 10
Gross spreads in the U.S. bond and Eurobond markets for U.S. firms that issue in both markets[a]

Variables	All years		F3Y		F-L3Y	
	U.S.	EU	U.S.	EU	U.S.	EU
FIRST 3YEARS	-0.011	0.276***	-0.005	0.279***	-0.021	0.292***
	(0.015)	(0.032)	(0.015)	(0.033)	(0.016)	(0.036)
LAST 3YEARS	-0.042***	-0.086**	-0.046***	-0.093**	-0.055***	-0.086**
	(0.015)	(0.036)	(0.016)	(0.043)	(0.017)	(0.043)
NONFINANCIAL	-0.218*	0.684	-0.198	0.734	0	0.292***
	(0.122)	(0.486)	(0.397)	(0.457)	0.000	(0.095)
PUBLIC	0.032	0.184***	0.026	0.146***	0.02	0.200***
	(0.022)	(0.038)	(0.021)	(0.041)	(0.025)	(0.047)
L AMOUNT	-0.052***	-0.004	-0.051***	-0.005	-0.050***	-0.014
	(0.004)	(0.014)	(0.004)	(0.015)	(0.005)	(0.017)
MATURITY	0.032***	0.022***	0.031***	0.022***	0.036***	0.028***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)
CCC	0.322	0	0.291	0	0.322	0
	(0.485)	0.000	(0.466)	0.000	(0.767)	0.000
B	1.173***	0.597	1.120***	0.572	1.038***	0
	(0.184)	(0.474)	(0.197)	(0.450)	(0.202)	0.000
BB	0.792***	0.725***	0.756***	0.702***	0.552***	0
	(0.125)	(0.274)	(0.151)	(0.267)	(0.169)	0.000
BBB	0.201**	-0.296***	0.198*	-0.276***	0.148	-0.481***
	(0.085)	(0.065)	(0.108)	(0.069)	(0.118)	(0.100)
A	0.191**	-0.181***	0.177*	-0.220***	0.144	-0.257***
	(0.084)	(0.050)	(0.107)	(0.053)	(0.117)	(0.060)
AA-AAA	0.077	0.009	0.043	-0.007	0.034	-0.041
	(0.085)	(0.057)	(0.108)	(0.062)	(0.119)	(0.066)
CALLABLE	0.355***	-0.192***	0.366***	-0.224***	0.334***	-0.281***
	(0.028)	(0.041)	(0.030)	(0.042)	(0.035)	(0.054)
SENIOR	0.008		0.006		0.081	
	(0.041)		(0.044)		(0.054)	
SINKING FUND	-0.066***		-0.050*		-0.036	
	(0.022)		(0.026)		(0.026)	
RULE 144A	0.093**		0.114**		0.120**	
	(0.037)		(0.045)		(0.054)	
RELATIONSHIP	0.063***	0.013	0.081***	0.014	0.101***	0.011
	(0.021)	(0.028)	(0.025)	(0.032)	(0.032)	(0.041)
UNDERWRITER SHARE	-0.137	-1.212***	-0.182*	-1.747***	-0.212*	-1.583***
	(0.100)	(0.421)	(0.108)	(0.493)	(0.122)	(0.534)
UNDERWRITERS	0.060***	-0.016	0.075***	0.006	0.076***	0.02
	(0.010)	(0.013)	(0.011)	(0.022)	(0.011)	(0.023)
SELF MANAGED	0.038	0.246***	0.043	0.233***	0.08	0.272***
	(0.037)	(0.065)	(0.044)	(0.073)	(0.054)	(0.077)
RECESSION	0.062***		0.052***		0.046**	
	(0.017)		(0.019)		(0.019)	
CONSTANT	-0.192	0.235	0.174	0.234	0.048	0.687***
	(0.331)	(0.470)	(0.410)	(0.446)	(0.391)	(0.133)
Observations	7230	3157	6156	2460	4901	1988
Number of issuers id	292	246	193	104	105	35
R-squared	0.36	0.25	0.36	0.26	0.39	0.28

EU first-years	0.276	0.279	0.292
U.S. first-years	-0.011	-0.005	-0.021
t-tests	9.25***	8.99***	9.20***
EU Last years	-0.086	-0.093	-0.086
U.S. Last years	-0.042	-0.046	-0.055
T-tests	-1.34	-1.27	-0.81

[a] Models estimated with robust standard errors and firm fixed effects. All years: Sample includes the bonds of all U.S. issuers (that issued in both markets) during the sample period (1995–2006). F3Years: Sample limited to the bonds of those U.S. issuers that issued at least once during the first three years of the sample period in both markets. F-L3Years: Sample limited to the bonds of those U.S. issuers that issued at least once during

the first three years *and* the last three years of the sample period in both markets. $FIRST\,3YEARS$: Dummy variable equal to 1 for bonds issued during the first years of the sample period. $LAST\,3YEARS$: Dummy variable equal to 1 for bonds issued during the last years of the sample period. $L\,TIME\,TREND$: is the log of time trend. $SENIOR$: dummy variable equal to 1 for senior subordinated bonds. $SINK\,FUND$: dummy variable equal to 1 for bonds that have a sinking fund. $CALLABLE$: dummy variable equal to 1 for callable bonds. $RULE\,144A$: dummy variable equal to 1 for bonds issued under Rule 144A. $MATURITY$: maturity of the bond. $L\,AMOUNT$: log of the issue amount. $NONFINANCIAL$: dummy variable equal to 1 for bonds issued by nonfinancials. $PUBLIC$: dummy variable equal to 1 for bonds issued by public firms. $UNDERWRITERS$: number of lead underwriters in the bond syndicate. $UNDERWRITER\,SHARE$: market share of the underwriter(s). CCC, B, $\cdots$ $AA - AAA$ set of dummy variables for bonds with the corresponding credit rating. $SELF\,MANAGED$: dummy variable equal to 1 when the underwriter issues debt for itself or for one of its subsidiaries. $RELATIONSHIP$: dummy variable equal to 1 when the bond underwriter has also served as a loan arranger to the issuing firm over a five-year period prior to the bond offering. $RECESSION$: dummy variable equal to 1 if the bond was issued during the 2001 recession. Included in the regressions but not shown in the table are (i) a dummy variable to account for the bonds with a missing rating, (ii) dummy variables to account for the currency of the issue, and (iii) dummy variables to account for the sector of activity of the issuer.
Source: Authors' computations.

Table 11
Gross spreads in the U.S. bond and Eurobond markets for U.S. nonfinancial firms that issue in both markets[a]

Variables	All years		F3Y		F-L3Y	
	U.S.	EU	U.S.	EU	U.S.	EU
FIRST 3YEARS	0.02	0.531***	0.007	0.539***	0.007	0.771***
	(0.025)	(0.101)	(0.024)	(0.100)	(0.028)	(0.136)
LAST 3YEARS	-0.002	0.024	0.03	0.092	0.024	0.075
	(0.041)	(0.121)	(0.057)	(0.134)	(0.057)	(0.140)
PUBLIC	0.135*	0.151	0.087	0.103	0.076	-0.042
	(0.070)	(0.139)	(0.058)	(0.151)	(0.057)	(0.105)
L AMOUNT	-0.071***	0.101*	-0.059***	0.151**	-0.053***	0.064
	(0.007)	(0.055)	(0.010)	(0.060)	(0.011)	(0.077)
MATURITY	0.014***	0.011**	0.011***	0.008	0.016***	0.011
	(0.002)	(0.004)	(0.002)	(0.007)	(0.003)	(0.008)
CCC	0.128	0	0.112	0	-0.148	0
	(0.329)	0.000	(0.298)	0.000	(0.594)	0.000
B	1.678***	1.465***	1.923***	1.348***	1.782***	0
	(0.221)	(0.211)	(0.245)	(0.215)	(0.213)	0.000
BB	1.116***	1.135***	1.295***	1.029***	1.246***	0
	(0.193)	(0.352)	(0.222)	(0.348)	(0.179)	0.000
BBB	0.301**	-0.462**	0.362*	0.030	0.124	-0.339
	(0.149)	(0.208)	(0.185)	(0.325)	(0.105)	(0.303)
A	0.263*	-0.048	0.279	-0.168	-0.049	-0.021
	(0.151)	(0.121)	(0.184)	(0.133)	(0.117)	(0.177)
AA-AAA	0.261*	0.070	0.263	0.023	-0.055	0.030
	(0.151)	(0.112)	(0.185)	(0.106)	(0.118)	(0.136)
CALLABLE	0.193***	-0.250*	0.080***	-0.439**	0.035	-0.431**
	(0.034)	(0.132)	(0.029)	(0.215)	(0.036)	(0.188)
SENIOR	-0.669***		-0.871**		-0.924***	
	(0.229)		(0.341)		(0.354)	
SINKING FUND	0.014		0.085		0.109	
	(0.051)		(0.069)		(0.078)	
RULE 144A	0.041		0.006		-0.022	
	(0.047)		(0.054)		(0.073)	
RELATIONSHIP	0.041	0.076	0.057**	0.078	0.044	0.111
	(0.025)	(0.067)	(0.029)	(0.078)	(0.038)	(0.099)
UNDERWRITER SHARE	0.059	-2.082*	-0.176	-3.192**	0.01	-2.915*
	(0.213)	(1.128)	(0.258)	(1.377)	(0.299)	(1.484)
UNDERWRITERS	0.040**	-0.041	0.026	-0.008	0.022	0.048
	(0.017)	(0.058)	(0.019)	(0.070)	(0.021)	(0.088)
RECESSION	0.143***		0.086**		0.089**	
	(0.033)		(0.034)		(0.042)	
CONSTANT	0.861***	0.883***	0.244	0.531*	0.363	0.862***
	(0.298)	(0.260)	(0.392)	(0.274)	(0.404)	(0.294)
Observations	1448	505	1015	322	713	181
Number of issuers id	175	129	116	46	62	18
R-squared	0.35	0.45	0.39	0.48	0.45	0.62
EU first-years	0.531		0.539		0.771	
U.S. first-years	0.02		0.007		0.007	
T-tests	6.99***		7.53***		8.67***	
EU Last years	0.024		0.092		0.075	
U.S. Last years	-0.002		0.03		0.024	
T-tests	0.26		0.49		0.38	

[a] Models estimated with robust standard errors and firm fixed effects. All years: Sample includes the bonds of all U.S. nonfinancial issuers (that issued in both markets) during the sample period (1995–2006). F3Years: Sample limited to the bonds of those U.S. nonfinancial issuers that issued at least once during the first three years of the sample period in both markets. F-L3Years: Sample limited to the bonds of those U.S. nonfinancial issuers that issued at least once during the first three years *and* the last three years of the sample period in both markets. $FIRST\ 3YEARS$: Dummy variable equal to 1 for bonds issued during the first years of the sample period. $LAST3YEARS$: Dummy variable equal to 1 for bonds issued during the last years of the sample period. $L\ TIME\ TREND$: is the log of time trend. $SENIOR$: dummy variable equal to 1 for senior subordinated bonds. $SINK\ FUND$: dummy variable equal to 1 for bonds that have a sinking fund. $CALLABLE$: dummy

variable equal to 1 for callable bonds. $RULE\ 144A$: dummy variable equal to 1 for bonds issued under Rule 144A. $MATURITY$: maturity of the bond. $L\ AMOUNT$: log of the issue amount. $PUBLIC$: dummy variable equal to 1 for bonds issued by public firms. $UNDERWRITERS$: number of lead underwriters in the bond syndicate. $UNDERWRITER\ SHARE$: market share of the underwriter(s). CCC, B, $\cdots$ $AA - AAA$ set of dummy variables for bonds with the corresponding credit rating. $SELF\ MANAGED$: dummy variable equal to 1 when the underwriter issues debt for itself or for one of its subsidiaries. $RELATIONSHIP$: dummy variable equal to 1 when the bond underwriter has also served as a loan arranger to the issuing firm over a five-year period prior to the bond offering. $RECESSION$: dummy variable equal to 1 if the bond was issued during the 2001 recession. Included in the regressions but not shown in the table are (i) a dummy variable to account for the bonds with a missing rating, (ii) dummy variables to account for the currency of the issue, and (iii) dummy variables to account for the sector of activity of the issuer.
Source: Authors' computations.

Table 12
Issuers' choice between the U.S. bond market and the Eurobond market[a]

Variables	Issuers					
	All	FINANCE	NONFIN	ALL F-L3Years	NONFIN	NONFIN F-L3years
GROSS SPREAD RATIO	-3.07***	-3.49***	-4.53***	-5.74***	-4.73***	-4.17***
	(92.95)	(81.49)	(66.85)	(246.2)	(72.79)	(32.30)
FOREIGN SALES RATIO					0.036***	0.041***
					(540.1)	(441.79)
RECESSION	-0.16	-0.09	-0.71	-0.295	-0.65	-0.613
	(1.15)	(0.35)	(2.13)	(2.05)	(1.77)	(1.23)
L AMOUNT	-0.17***	-0.23***	0.135***	-0.195***	0.113***	0.159***
	(160.9)	(207.2)	(28.46)	(125.6)	(18.28)	(25.53)
CALLABLE	0.198***	0.545***	0.195*	0.335***	0.263**	0.107
	-7.65	(30.51)	(2.98)	(16.68)	(5.25)	(0.57)
MATURITY	0.008***	-0.01***	0.122***	0.031***	0.103***	0.110***
	(8.83)	(13.16)	(108.4)	(58.85)	(76.9)	(64.08)
RULE 144A	0.254***	0.162**	-0.15	0.742***	0.055	0.548***
	(23.08)	(6.58)	(2.04)	(125.63)	(0.23)	(20.19)
CCC	-1.34*		0.479	-0.986	-0.19	-0.283
	(2.79)		(0.31)	(1.65)	(0.07)	(0.195)
B	-0.32**	0.575***	0.419**	-0.562***	-0.011	-0.145
	(4.33)	(24.86)	(4.03)	(14.22)	(0.01)	(0.4592)
BB	0.306***	0.800***	0.775***	-0.112	0.420***	0.266
	(7.62)	(14.95)	(24.1)	(0.98)	(6.83)	(2.07)
BBB	0.623***	0.857***	1.368***	0.417***	1.085***	0.986***
	(24.61)	(8.43)	(79.62)	(12.21)	(49.06)	(39.13)
A	0.784***	0.810***	0.877***	0.239**	0.630***	0.691***
	(54.59)	(34.83)	(27.38)	(4.58)	(14.35)	(11.77)
AA	0.587***	0.494***	0.207	-0.096	0.381**	0.856***
	(33.22)	(15.94)	(1.85)	(0.86)	(6.15)	(19.79)
AAA	-0.82***	-1.03***	0.423*	-1.312***	0.636***	-0.752**
	(42.15)	(43.73)	(3.52)	(89.15)	(7.44)	(6.09)
NONFINANCIAL	0.946***			0.863***		
	(641.4)			(558.7)		
CONSTANT	3.435***	3.686***	4.451***	6.31***	2.003***	1.155*
	(158.5)	(132.3)	(67.62)	(408.9)	(14.49)	(2.91)
U.S. Issuers	31243	22495	8748	20687	8748	6083
EURO Issuers	4458	3380	1078	2586	1078	835
R-Square	0.145	0.151	0.207	0.147	0.227	0.271
Likelihood Ratio	5386	3927	2278	3698	2534	2183

[a] Models estimated with robust standard errors and firm fixed effects. All years: Sample includes the bonds of all U.S. issuers (that issued in both markets) during the sample period (1995–2006). F-L3Years: Sample limited to the bonds of those U.S. borrowers that issued at least once during the first three years *and* the last three years of the sample period in both markets. Included in the regressions but not shown in the table are year dummy variables. GROSS SPREAD RATIO: the ratio of estimated gross spread in the U.S. bond market divided by the sum of the estimated gross spreads in the U.S. and Eurobond markets (see section 2.1.2 for a formal definition). FOREIGN SALES RATIO: the ratio firm revenues derived from overseas operations divided by total revenues. $CALLABLE$: dummy variable equal to 1 for callable bonds. $RULE\,144A$: dummy variable equal to 1 for bonds issued under Rule 144A. $MATURITY$: maturity of the bond. $L\,AMOUNT$: log of the issue amount. CCC, B, $\cdots$ $AA - AAA$ set of dummy variables for bonds with the corresponding credit rating. $RECESSION$: dummy variable equal to 1 if the bond was issued during the 2001 recession. $EURO$: dummy variable equal to 1 if the bond denominated in euros. $DOLLAR$: dummy variable equal to 1 if the bond denominated in dollars.
Source: Authors' computations.