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Is the Corporate Loan Market Globally Integrated? A Pricing Puzzle

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ABSTRACT

We offer evidence that interest rate spreads on syndicated loans to corporate borrowers are economically significantly smaller in Europe than in the United States, other things equal. Differences in borrower, loan, and lender characteristics do not appear to explain this phenomenon. Borrowers overwhelmingly issue in their natural home market and bank portfolios display home bias. This may explain why pricing discrepancies are not competed away, though their causes remain a puzzle. Thus, important determinants of loan origination market outcomes remain to be identified, home bias appears to be material for pricing, and corporate financing costs differ across Europe and the United States.

WE OFFER EVIDENCE THAT PRICES OF SYNDICATED corporate loans differ between the European and U.S. markets, with interest rate spreads smaller in Europe by about 30 basis points (bps) on average over the past decade, after controlling for risk and other factors. The differences are economically and statistically significant. Levels of differences are larger for riskier borrowers, but spreads in the European market are roughly 20% less than for comparable loans in the United States across the risk spectrum. We cannot reject the hypothesis that price differences are as large today as they were a decade ago. We control for a host of factors known (or thought) to affect corporate debt decisions and pricing. Although many controls are correlated with levels of spreads, they have little effect on the price difference across markets.

Such a material difference in pricing can persist only if lenders and borrowers fail to compete it away. Though we focus on pricing, we provide some evidence about the location of borrowers' and lenders' activity. The data show that borrowers stay home when they can and that they tend to issue in Europe when they must issue abroad. Specifically, borrowers domiciled in one of the major markets (Europe, United States, and Asia) almost always issue in that market, whereas borrowers domiciled elsewhere usually issue in Europe. Lenders cross

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borders more frequently, but still display significant home "bias."[1] About one-quarter of the volume of lending in the United States and European markets is provided by lenders headquartered elsewhere, but lenders domiciled in a market region still participate in loans made in that market significantly more frequently than the share of such loans in the world syndicated loan market. This market segmentation likely prevents competition from causing prices to converge in the two markets.[2]

Our results are important to financial intermediation because they imply that economically important determinants of loan supply and demand remain to be identified. Our results are important for corporate finance because loans are an important source of firms' external finance, and we show that costs of loan finance differ across Europe and the United States (Houston and James (1996) find that two-thirds of U.S. firms' total debt is bank debt). Our results are also important to the international finance literature because they are consistent with first-order pricing effects of home bias, not just quantity effects. In passing, we shed light on hypotheses in the financial intermediation literature, for example, whether the distance between lenders and borrowers matters (Petersen and Rajan (2002), Degryse and Ongena (2005)).

Most financial research casts location in terms of the domicile of the issuer or the investors. However, the markets in which issuers and investors transact can differ from their domiciles. Just as wholesale buyers and sellers of fashionable clothing may meet and transact in New York or Paris even though their firms are located elsewhere, transactions in syndicated loans tend to be centered in London, New York, and Hong Kong. We analyze the impact of borrower and lender domicile, but we cast most of our analysis in terms of market location because it is consistent with market practice and because it provides the most illuminating view. The reasons why "market" matters are a subject for future research—this paper only provides evidence that it does.[3]

A natural first hypothesis about pricing differences is that loan or borrower characteristics differ across markets. Our empirical tests control for a wide variety of factors and mechanisms suggested in the corporate debt and financial intermediation literatures, including potential cross-market differences in credit risk, nonprice loan terms (e.g., maturity), asymmetric information or

[1] We borrow the term "home bias" from the international finance literature, which documents that individuals underweigh foreign assets in their portfolios relative to weights suggested by models of optimal diversification. Since these models rely on risk aversion as the fundamental source of demand for diversification, the applicability to presumably risk-neutral banks is not obvious, so "bias" may not be the best term. Nevertheless, since the term is familiar, we use it.

[2] We speculate that the administrative vehicle for home bias is banks' internal country or regional lending limits, which would explain why U.S. borrowers do not flock to the cheaper European market (they would not be welcome if European banks already are at their limits for U.S. exposure). Of course, attributing home bias to lending limits simply translates the home bias puzzle into a limits puzzle.

[3] Because borrowers usually stay home, a reader wishing to set aside the "market" concept usually will not go far wrong by interpreting "market" as "region in which the borrower is domiciled," though such an interpretation does not capture all the facts.

moral hazard (Diamond (1984), Berlin and Mester (1992)), legal regime (La Porta et al. (1997)), multiproduct package pricing practices, regulation (McCauley and Seth (1992)), currency in which the loan is denominated, and others. We find that many of these considerations are material to loan pricing, but the difference in average loan spreads across markets persists, suggesting that the market effect is not due to well-understood differences in the composition of borrower or loan characteristics. Moreover, the pricing difference is not driven by borrowers from a subset of European countries nor by lenders from a subset of countries, nor does it appear to be driven by state-owned banks or differences in regulation across countries.

A natural second hypothesis is that unexplained price differences are due to errors in our data or to weakness of the proxy variables that we use in testing hypotheses. Price differences do not appear to be a data problem. The result is remarkably robust, and we have cross checked key variables with alternative sources. We use multiple proxies for credit risk, which is the most important control variable. More generally, we use conventional variables from the literature on corporate debt and are left with an economically important puzzle.

We cannot reject the hypothesis that our finding is evidence of market inefficiency in the sense of myopic behavior by market participants. However, the size of the pricing difference and the sophistication of syndicated loan market participants lead us to discount this possibility. The most active lenders are large banks headquartered in a variety of nations, each with significant international operations. Many lend in both the United States and Europe. Similarly, borrowers are large corporations, many with international operations. It is difficult to believe that such market participants would fail to cross oceans in pursuit of lower financing costs due to myopia.

We are left with an economically material pricing puzzle that appears to consist of two parts. One part, home bias, is itself a familiar puzzle in the literature (Karolyi and Stulz (2002) offer a survey). Whatever causes lender home bias and borrowers' propensity to stay home almost surely contributes to the loan pricing difference by limiting competition. Our paper adds to the importance of the home bias puzzle by providing evidence that it may be relevant for prices.[4] However, regional biases of lenders and borrowers are not a sufficient condition for pricing differences. Some additional factor or friction must create some difference in supply or demand conditions to push loan prices to different equilibrium values in different regions. The existence of this factor or friction is a new puzzle revealed by our paper.

Our evidence is important in other respects. For regulators, our evidence implies that loan prices should be used with care in banking supervision. Ashcraft and Morgan (2003) suggest that a high incidence of relatively high-spread loans

[4] One strand of the home bias literature, including Flood and Rose (2003), tests whether the law of one price holds across markets, interpreting rejections as evidence of less than fully integrated markets.

in a bank's portfolio might be evidence of excessive risk taking.[5] Our findings suggest that controlling for differences in loan and borrower characteristics, including location, may be important for proper regulatory use of loan price information. For macroeconomists, our evidence implies that even large corporate loan markets of major industrial nations may be rather segmented. Thus, domestic regulatory and monetary policies may have a more significant impact on the availability and cost of loan finance and economic activity than in a fully integrated world.[6]

A question relevant to the interpretation of our results is whether spreads on European and U.S. corporate bonds differ on average. Mahajan and Fraser (1986) find that they do not. While a thorough investigation using more recent individual bond-level data is beyond the scope of this paper (the data and institutional considerations would be quite different than for loans), we briefly examine spreads estimated from daily Merrill Lynch bond index yields and swap data for the period January 1999 to May 2003 for A- and BBB-rated firms. After accounting for duration and currency effects, we find only small mean and median differences in bond spreads.[7]

The remainder of the paper is in five parts. Section I describes the data and provides some institutional background. Section II presents simple summary statistics about loan flows. Sections III and IV discuss hypotheses about why loan pricing might differ by region and present evidence about their relevance. Section V offers concluding remarks.

I. Data and Institutional Background

Though loans have been syndicated since at least the Medici era, in the 1960s the market started becoming organized and increasingly prominent, serving large multinational corporations, sovereigns, and quasigovernmental entities.

[5] Other papers that empirically examine syndicated loans include Dennis and Mullineaux (2000), who study syndicated loans in the United States; Bae and Goyal (2003) and Casolaro, Focarelli, and Pozzolo (2003), who examine the pricing of internationally syndicated loans; and Angbazo, Mei and Saunders (1998), who report estimates of factor models for highly leveraged transaction loans.

[6] Another strand of the literature, including Santos and Tsatsaronis (2003), examines whether the nationality of providers of financial services affects prices or quantities of such services. Most of the literature focuses on equity, bond, and money markets. Adam et al.'s (2002) survey finds that some markets are integrated while others are not. Berger et al. (2003) study globalization of the banking industry.

[7] We swap U.S. and European bond index yields into spreads over dollar LIBOR and adjust for the cost of converting the resulting European bond spread, which is denominated in euros, to dollars using forward exchange rates. We then regress U.S.–European spread differences on the difference and the square of the difference in the average duration of the two Merrill Lynch bond indexes, interpreting intercepts as the adjusted mean difference (R^2 near 0.5). Intercepts are 1.9 bps for BBB- and 4.8 bps for A-rated bonds. Without the duration adjustment, means (medians) are 21 (12) bps and 10 (5) bps for BBB- and A-rated bonds, respectively. All data are from Bloomberg. We do not claim that this is strong evidence of no bond spread difference. Such a claim would require careful analysis of individual bond data.

Syndicated loans are typically floating rate debt in which the interest rate paid on outstanding balances is specified as a market-determined base rate plus a spread specified in the loan contract. The rate the borrower pays is reset periodically to reflect the prevailing market value of the base rate. The base rate is frequently LIBOR, but EURIBOR, TIBOR, and other base rates are also used. All lenders are party to the same debt contract. During syndication, one or more lead lenders seek additional lenders to be party to the contract, relieving the borrower of the need to find lenders and to negotiate a separate contract with each lender.

Loans can be characterized by the location of the market in which they are issued. For example, the early modern syndicated loan market was centered in London and served borrowers from around the world, perhaps in part because London hosted the most important market for Eurodollar bank deposits that paid LIBOR. Thus, while most borrowers and lenders were domiciled outside the United Kingdom, they met to do deals in London, much as transactions in real goods and services may occur in a marketplace distant from the home of the buyer and seller. Today, London, New York, and Hong Kong are the most prominent markets, but smaller submarkets exist in continental Europe, the South Pacific, and elsewhere (we combine loans from all European sub-markets in defining the European market empirically). Many global banks have separate loan syndication desks in each of these markets. For example, Deutsche Bank is the lead agent on many transactions in both the European and U.S. markets. Its European deals are carried out by staff located in London or Frankfurt, while its U.S. deals are done by staff located in New York. It is this aspect of location that defines the market in which a deal is issued. Typically, borrowers choose to issue in their local or regional market, and lead banks focus their syndicate-building efforts on banks that commonly participate in that market. Because some lending banks operate only in one market (generally their home market), the "rolodex" that lead banks use in building syndicates is somewhat different in each market.

Volumes have become large over the past two decades as the market has come to serve the loan financing needs of many medium-sized corporations. Volumes grew especially rapidly in the United States during the late 1980s and early 1990s, but since 1992 volume has grown somewhat more rapidly in the European and Asian markets than in the U.S. market (Figure 1).

Data on syndicated loans are from Dealogic's Loanware database, which contains information about loan borrowers, lenders, pricing, and nonprice terms at origination but no information about repayment history. The database also identifies the market in which each loan was made. Loanware is broadly similar to Loan Pricing Corporation's (LPC) Dealscan database, but the two differ in coverage, especially in earlier years. In particular, LPC's data collection efforts focused primarily on the U.S. loan market until the late 1990s, whereas entries in Loanware are largely from non-U.S. markets until the early 1990s. We use Loanware because we examine global activity; however, we use data only for

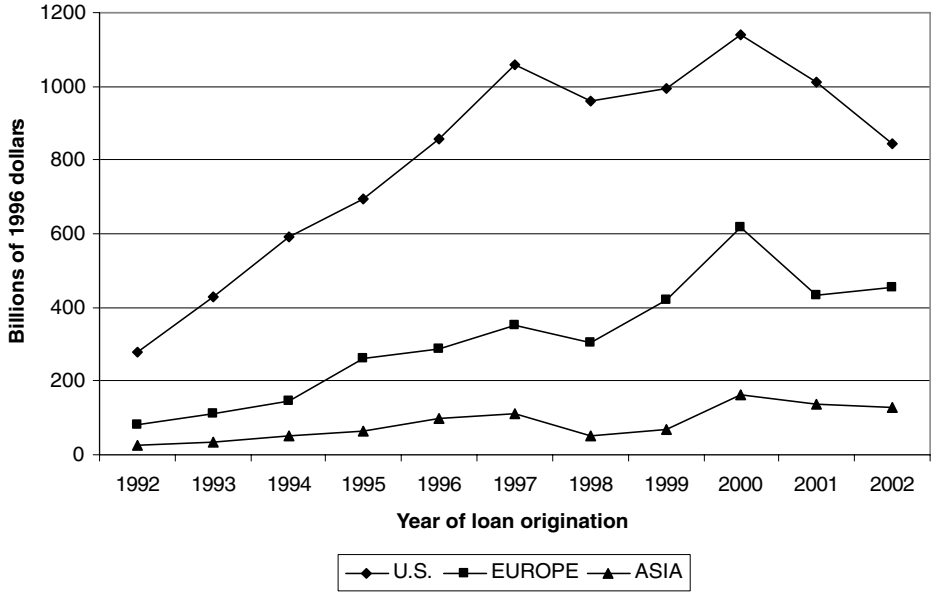

Figure 1. Issuance volume in the major syndicated loan markets. Loans issued in currencies other than dollars are converted to U.S. dollar amounts in Loanware using exchange rates on or near the loan contract date. Such amounts are then converted to 1996 constant dollars using the GDP deflator. Face amounts of loan commitments are used, that is, undrawn commitments are included in totals.

loans originated during the 1992–2002 period because Loanware coverage of U.S. loans appears markedly less complete before 1992.[8]

Agency credit ratings are our primary measure of borrower credit quality. Loanware includes ratings, but we also match borrowers by name to Moody's Default Risk Service database, which includes a history of Moody's corporate rating actions, in order to measure the evolution of borrower credit quality after loans are made. Where both a Moody's and an S&P rating are available, we use

[8] We compare Loanware and Dealscan's coverage of loans by drawing small random samples of loans from each and searching for matching loans in the other database. Dealscan has no or incomplete information for about 80% of the European market loans in Loanware from 1992 to 1997, but the overlap is good (about 90%) from 1998 on. Dealscan has information for about 80% of U.S. market loans in Loanware throughout 1992–2002 and over 90% if very small loans are ignored. However, 8 of 22 U.S. market loans randomly drawn from Dealscan do not appear in Loanware, with no apparent trend in the miss rate, and Loanware appears more likely to make minor errors in recording lender identities and roles in the earlier years. About one-half of the misses are smaller than average loans but none are tiny. It may be that the implied undercount in Loanware is specific to the sample, since total volumes of U.S. market loans in the two databases appear similar. Overall, the facts imply that Loanware is the better choice for this paper's purposes.

the riskier of the two ratings. The results are robust to using just Moody's or just S&P ratings.[9]

Although a number of previous studies use accounting ratios as proxies for credit quality, most such studies focus on only U.S. firms, which are subject to uniform accounting standards. We do not focus on such measures because of the difficulty of adjusting the ratios of borrowers in different nations to be compatible. However, our results are robust to the inclusion of standard measures of firm size, leverage, and profitability, as described further below. As an additional measure of credit risk, we use the estimate of borrower default probability, "EDF" produced by Moody's KMV CreditMonitor implementation of Merton's (1974) model. EDFs are available only for a subset of our pricing sample, as described further below.

We use loans to borrowers domiciled in any nation when examining international loan flows. However, to reduce the problem of unmeasured credit quality correlated with nationality, our pricing sample includes only loans to borrowers in a set of industrialized nations that approximates the membership of the OECD.[10] Country risk assessments often influence loan pricing and origination decisions for emerging market borrowers. Although country risk may also affect pricing in our sample, we expect the effects to be much smaller than for emerging market borrowers and to be reflected to a greater extent in the ex post rating measures that we use as control variables. Results reported later in the paper are consistent with this view.

We control for the nationality of both borrowers and lenders.[11] It is common for syndicates to involve lenders with different nationalities, and the importance of these lenders may depend on their role in the syndicate. For example, the lead or agent banks in a syndicate are often thought to play a larger role and to be better informed than other participant banks (Dennis and Mullineaux (2000)). Consequently, when we examine the effects of differences in the nationality of syndicates, we verify robustness by using several different sets of variables:

- A dummy variable for whether the syndicate includes any lender or any lead bank whose nationality is different from that of the borrower.

[9] About one-quarter of the Moody's ratings reported in Loanware are incorrect, but the majority of the errors are a single tick on the rating scale. Loanware's reported ratings are a little bit riskier than corrected ratings on average, but the bias is similar for loans made in the U.S. and European markets, as is the error rate.

[10] We use OECD countries, but we omit Poland, Slovakia, Czechoslovakia, and Turkey and we include the non-OECD countries Hong Kong, Singapore, and Taiwan. Other OECD countries in the sample include the United States, Canada, the United Kingdom including Ireland, Germany, France, Switzerland, Italy, Spain, the Netherlands, Norway, Sweden, Denmark, Austria, Portugal, New Zealand, Japan, Australia, Belgium, Finland, Iceland, South Korea, Liechtenstein, Monaco, and Luxembourg. As a practical matter, borrowers from the first dozen or so countries dominate our pricing sample.

[11] Our data allow us to distinguish between the nationality of the parent organization and the particular subsidiary that is borrowing or lending. Our results are not materially affected by the distinction.

- A dummy variable indicating whether the nationality of all lenders or all lead banks is different from that of the borrower.
- Dummy variables that indicate the presence of any lenders from particular nations or regions.
- The fraction of syndicate lenders from each nation or region.

Many loan deals include multiple parts, or tranches, such as a line of credit and a term loan. Because pricing and the identity of lenders can differ across tranches within a deal, we use each tranche as the unit of analysis. The results are similar if we aggregate tranches into deals (the average deal has 1.5 tranches).

Our primary measure of loan price is an all-in interest rate spread that includes the contract spread over LIBOR on the loan's outstanding balance plus any annual fee and any upfront fee prorated over the life of the loan. Fee information is often missing in Loanware, so we include in the factor models a dummy variable for the presence of fee information that helps control for such noise in our pricing measure. To limit the influence of outliers, we winsorize spreads at the 1st and 95th percentiles for each grade. The results are robust to using other percentiles as cutoffs and to using raw spreads.

For analysis of pricing, we drop loans without a LIBOR spread. The most common alternative base rates in the United States and European markets are Prime and EURIBOR, respectively. Prime is a managed (not market-determined) rate not comparable to LIBOR, and in our data information about EURIBOR-based loans is always incomplete.[12]

II. Loan Flows: Who Goes Where?

Some facts about loan flows provide useful background for an examination of pricing differences. If most borrowers and lenders operate only in their home markets, then the forces tending to promote price convergence may be weak, although one would still expect similar risks to be priced similarly in long-run equilibrium.

Panel A of Table I displays the percentage of syndicated loan volume in the European, U.S., and Asian syndicated loan markets that is due to activity by borrowers in different domiciles. Panel B shows how borrowers in each domicile allocate their issuance across the three markets. The table reveals that borrowers usually stay home and that Europe is usually the market of choice for borrowers located outside the three markets. That is, U.S. firms almost always issue in the U.S. market, European firms in the European market, and Asian firms in the Asian market, as indicated by fractions in excess of 90% in Panel B. However, firms with no natural local syndicated loan market, most

[12] All-in spreads are not available for EURIBOR-based loans. Results are robust to using contract spreads alone (without fees) as the pricing measure. This is true whether the sample includes EURIBOR-based loans or is limited to LIBOR-based loans. When fees alone are used, there is no apparent difference in pricing across markets, but the sample is much smaller, and fees are also relatively small, averaging about 8% of the spread.

Table I

Relationship of Market Region and Borrower Domicile

Data are for all multilender loans reported in Loanware as made in the three markets below during the 1992–2002 period. Panel A examines the composition of each market in terms of borrower domicile, whereas Panel B examines the market choices of borrowers from each domicile, one at a time. U.S. tax havens excluded in the last line of Panel B are Bermuda, the Bahamas, and the Cayman Islands.

Panel A: Percentage of Syndicated Loan Volume in Each Market Due to Borrowers in Each Domicile

Borrower Domicile	U.S. Market	European Market	Asian & SW Pacific Market
United States	97.7	3.2	2.6
Europe	0.5	81.8	1.0
Latin America	0.2	6.3	0.3
Canada	1.0	0.6	0.0
Asia & SW Pacific	0.1	1.9	94.4
Other	0.5	6.2	1.7
Total	100.0	100.0	100.0

Panel B: Percentage of Syndicated Loan Volume Issued by Borrowers in Each Domicile Appearing in Each Market

Borrower Domicile	U.S. Market	European Market	Asian & SW Pacific Market	Total
United States	98.5	1.2	0.3	100.0
Europe	1.7	98.0	0.3	100.0
Latin America	6.0	93.0	1.0	100.0
Canada	80.5	19.4	0.1	100.0
Asia & SW Pacific	0.9	6.9	92.2	100.0
Other	15.1	79.0	5.9	100.0
Other ex- U.S. tax havens	2.2	91.9	5.9	100.0

prominently Latin American firms and those in the "Other" category, tend to use the European market, not the U.S. market, even though the U.S. market is larger by aggregate volume.[13] Even Canadian firms issue 19% of their loans in the European market, which is surprising given the tight integration of the U.S. and Canadian financial markets. Latin American borrowers' preference for the European market does not appear to be due to a preference for Spanish or Portuguese banks, as such banks' share of loans to Latin American borrowers is about 10%, similar to their share of other European market loans. It is possible that non-U.S. and non-Asian borrowers use the European market for historical reasons (as noted, London was the center of the market years ago), but it is also possible that firms that must issue far from home choose the cheaper markets.

In contrast to borrowers, lenders are more likely to cross borders, at least as a group. The left panel of Table II shows that 20–30% of lending in each market is by out-of-region lenders. By-volume and by-number results are similar except

[13] This contrasts with equity markets, where firms often choose to issue in the U.S. market (Henderson, Jegadeesh, and Weisbach (2003)).

Table II
Out-of-Market-Lender Share of Loans in Each Market

Data are for all multilender loans reported in Loanware as made in the three markets below during the 1992 to 2002 period that include information about participating lenders' shares of the amount of the loan. Results are similar if loans for which shares are missing are included by assuming each lender takes an equal share.

	Percentage of Lenders from Outside the Market		Percentage of Lead Lenders from Outside the Market	Number of Lenders in Syndicate	
Market	By Volume	By Number	By Number	Median	Mean
U.S.	29	21	12	4	8
Europe	23	20	19	8	11
Asia	21	19	17	7	9

for the United States, where a difference arises because non-U.S. lenders are more likely to participate in large loans than in small loans. As the middle panel shows, lead lenders are somewhat less likely to be domiciled outside the market, especially in the United States, where only 12% of lead lenders are foreign.

Although lenders cross borders more than borrowers, the fractions in Table II are small enough to hint that lenders may be subject to home bias. The degree to which total loan portfolios mimic the world loan portfolio cannot be measured accurately with Loanware data because many bank loans are not syndicated (and some syndicated loans do not appear in Loanware). However, virtually all banks have substantial volumes of loans that are almost by necessity domestic because such loans are originated to small firms through domestic branches. Thus, lenders that seek to invest in the world loan portfolio would need to *overweight* foreign borrowers in the syndicated loan portion of their portfolios.

Table III presents lenders' portfolio allocations of syndicated loans to borrowers in different regions. For example, the first column shows that lenders domiciled in the United States channel 91% of their syndicated lending volume to U.S. borrowers, 6% to European borrowers, and 3% to other-region borrowers. The right panel gives the share of loan volume to borrowers in each region in the global syndicated loan portfolio as represented by Loanware. This is an estimate of the portfolio shares that would appear in other columns of Table III if lenders seek to hold the world syndicated loan portfolio. Like other assets, it appears that syndicated loan portfolios display substantial home bias.[14] Lenders in each region overweight borrowers in their home region by about 30–40 percentage points.[15]

[14] Buch, Driscoll, and Ostergaard (2004) also find that banks from France, Germany, the United Kingdom, and the United States display a home bias in their aggregate asset portfolios.

[15] If shares are computed separately for rated and unrated borrowers, lenders are more overweight the unrated firms in their region, but are economically significantly overweight both rated and unrated borrowers. Thus, home bias characterizes our pricing sample as well as the full sample.

Table III

Home Bias: Portfolio Allocations of Lenders in Each Region

Data are for all multilender loans reported in Loanware as made in the three markets below during the 1992–2002 period that include information about participating lenders' shares of the amount of the loan. If loans with missing shares are included, results are similar except that lenders from the other region have shares of 40%, 14%, and 46% in loans to U.S., European, and other borrowers, respectively (for loans without share data, we assume each lender takes an equal share).

	Lender Region			
Borrower Region	U.S.	Europe	Other	Global Weight
U.S.	91	39	31	64
Europe	6	51	12	22
Other	3	10	57	14
Total	100	100	100	100
Lender-region share	49	35	16	

The final row of Table III gives the shares of lenders from each region in the global market. U.S. lenders' share, at about 50%, is smaller than U.S. borrowers' share, which is about 67% (the latter not shown in table), whereas European and other-region lenders' shares are somewhat larger than those of borrowers from the same region.

III. Pricing: Univariate Statistics, Base Factor Model, and the Usual Suspects

As noted above, we focus on the U.S. and European markets in analyzing pricing and we restrict our attention to borrowers from industrialized nations. In part, we do so because we expect integration to be most complete for these markets and borrowers. Moreover, we usually omit Asian loan markets because usable loan samples are relatively small and the 1997 Asia crisis complicates interpretation of results.[16]

We examine all-in interest rate spreads at origination because all our sample loans are floating rate instruments, so borrowing costs differ across firms only to the extent that spreads and fees differ. The main challenge is controlling for differences in borrower characteristics and in the nonprice terms of loans, particularly credit risk, since that is the primary risk borne by lenders.[17]

[16] Comparing spreads on similar loans issued in different markets by the same borrower at the same time would be desirable, but the number of such loans is too small. Even if "same time" means "no more than 6 months apart," which is a rather wide window, the number of usable loan pairs is less than 20. In this small sample, mean European spreads are less than mean U.S. market spreads on average. The number of observations is small because borrowers "stay home" and because "global" offerings (simultaneous issues in multiple markets) are rare in the syndicated loan market.

[17] Prepayment risk driven by credit quality changes might be materially different across the two markets. Most corporate loans are prepayable without penalty, so borrowers with improving credit

Table IV
Distribution of Borrowers by Rating

Data are for all multilender loans reported in Loanware as made in the three markets below during the 1992–2002 period and that have a rating reported in Loanware, or a rating we are able to locate by matching to Moody's DRS database. However, all loans are in the denominator of the measures in the last row. Ratings are the riskier of Moody's and S&P ratings when both are available and are as of the loan contract date. Values are percentages of total loan volume.

	Market	
Rating	U.S.	European
Investment grade (percent)	73	88
AAA and AA	9	19
A	35	43
BBB	28	25
Speculative grade (percent)	27	12
BB	14	7
B	12	6
Less than B	1	0
Percent of total volume by unrated borrowers	66	40

Ratings are our primary measure of credit quality. Table IV displays the distribution of loan volume in each market by agency grade for loans to borrowers for which we have a rating at the time the loan contract was signed. As noted, we use the riskier of Moody's and S&P's rating if both are available (results are qualitatively similar if we use one or the other). Loans to below-investment grade borrowers are substantially less common in the European market, whereas borrowers rated AAA and AA are more common. The requirement that we have a rating for the borrower at issuance greatly reduces the size of the sample usable for pricing analysis. Many borrowers are not rated, especially in the European market, and Loanware does not always report ratings for rated borrowers. Our match to Moody's DRS database mitigates the latter problem, however.

Table V shows that simple mean spreads differ across the European and U.S. markets. The first two columns of the left panel display mean spreads by grade for the U.S. and European markets for the whole 1992–2002 period for loans to borrowers in industrialized nations. Pricing is similar on average for the AA and A grades, but spreads are 27, 54, and 66 bps smaller on average in the European market for the BBB, BB, and B grades, respectively. Differences are somewhat less dramatic when borrowers from emerging market nations are included in the sample, as shown in Panel B of the table, consistent with such borrowers often paying higher spreads than OECD firms and with emerging market firms issuing mainly in Europe.

quality tend to refinance in order to obtain smaller spreads. However, as we discuss further below, postissuance rating migration rates are similar in the European and U.S. markets, so prepayment risk seems likely to be similar on average. Interest rate-driven prepayment risk is immaterial because loans are floating rate.

Table V
Mean Spreads by Grade and Market (Basis Points)

The sample is restricted to loans to borrowers for which a rating is available on the date the loan contract is signed. Ratings are the riskier of Moody's and S&P's rating if both are available. Spreads are all-in measures that include the contract spread on outstanding balances plus annual fee plus any upfront fee prorated over the original term to maturity of the loan. Fixed rate loans; loans with no spread information, notes and private placements; and loans with ESOP or debtor-in-possession as the stated purpose of the financing are excluded.

	Panel A: Borrowers from Industrialized Nations Only			Panel B: Borrowers from All Nations		
Rating	U.S. Market	European Market	Difference	U.S. Market	European Market	Difference
AA	30	32	−2	31	31	0
A	44	40	4	44	41	3
BBB	92	65	27	92	78	14
BB	182	128	54	186	152	34
B	255	189	66	249	204	45

Nonprice characteristics of loans differ somewhat across the two markets, as shown in Table VI. The left panel presents averages for the full sample and the middle and right panels for two regression samples. Focusing first on the full pricing sample in Panel B, original maturities are about a year longer in the European market, average loan sizes are quite a bit larger, secured loans are less common, and special-purpose financings and government-affiliated borrowers are more common.[18] Several such differences are related to differences in rating patterns across the two markets.[19] Similarly, most of the differences between the full sample (Panel A) and the regression sample arise because the unrated firms that appear in the full sample differ in size from rated firms.

Loans may also differ in the currency in which they are denominated, raising the possibility that expectations about exchange rate movements might drive differences in loan spreads across markets. We address this possibility in more detail below, in part by producing results for a pricing subsample that includes only loans denominated in U.S. dollars (Panel C of Table VI). Dollar-denominated subsample characteristics are generally similar to those of the full pricing sample, but the number of European market observations drops

[18] We speculate that the small incidence of lines of credit in Europe in the full sample is associated with the popularity in Europe of demand deposit accounts with overdraft privileges. The share of lines of credit is similar in Europe and the United States in the rated sample. We speculate that rated firms, which are larger, need large amounts of flexible financing, implying a need for overdraft facilities at many banks, which is more cumbersome to manage than a line of credit.

[19] Fewer firms are rated in Europe and those that are rated are even more likely to be very large than in the United States (and large firms tend to issue large loans). The fraction of investment grade borrowers is larger in Europe than in the United States and low risk firms are less likely to post collateral.

Table VI
Some Nonprice Terms of Syndicated Loans and Borrower Characteristics

Data for the full sample are for all multilender loans reported in Loanware as made in the three markets during the 1992–2002 period. Data for the regression sample are restricted to loans to borrowers in industrialized nations and for which ratings and spreads at issuance are available, with the ratings no better than A+ and no worse than B–. Panel C includes only U.S. dollar-denominated loans from the full regression sample. Fixed rate loans, notes and private placements, and loans with ESOP or debtor-in-possession as the stated purpose of the financing are excluded

	A: Full Sample		B: Full Regression Sample		C: Dollar-Denominated Regression Sample	
Loan or Borrower Characteristic	U.S. Market	European Market	U.S. Market	European Market	U.S. Market	European Market
Number of usable observations	34,345	13,783	10,590	852	10,545	404
Median term to maturity (months)	48	60	48	60	48	60
Median loan size ($millions)	147	125	316	417	316	357
Mean loan size ($millions)	370	340	672	983	672	987
Percent lines of credit	64	35	71	67	71	63
Percent secured	31	26	32	13	32	16
Stated purpose of loan (percent)						
General corporate purposes	83	65	80	69	80	57
Takeover, acquisition, recap	3	1	3	2	3	2
Project finance	2	17	1	3	1	2
Ships, aircraft, or SPVs	2	10	1	7	1	12
Backup line	10	7	15	19	15	28
Type of borrower (percent)						
Nonfinancial firms	86	79	89	74	89	75
Government-affiliated	1	17	1	13	1	18

by about half. To save space in the remainder of the paper, we report most regression results only for the dollar-denominated sample, but results are similar for both pricing samples; a full set of results for the full regression sample is tabulated in Carey and Nini (2004).

The first row of Table VI shows that the restrictions applied in forming the regression samples disproportionately reduce the number of European market loans. Both regression samples are restricted to loans to borrowers in industrialized nations and for which ratings and spreads at issuance are available. The disproportionate effect occurs because, as noted previously, the European sample includes most emerging market borrowers (who are dropped), firms in the U.S. market are more likely to be rated, and spreads are more frequently missing in European-market observations.

A. Base Specification

The differences in characteristics shown in Table VI (or other differences in market composition) may account for the differences in spreads in Table V.

We test hypotheses about determinants of differences in spreads by estimating ordinary least squares factor models for spreads that include various combinations of control and proxy variables. Table VII reports results for a base-case specification. The base specification includes:

- Dummy variables for each tick on the agency rating scale. The omitted category is loans to borrowers rated A+, the safest in the sample, so estimated coefficients measure the premium that successively riskier borrowers paid on average across the two markets. Estimated values increase monotonically and magnitudes appear reasonable. We exclude loans to borrowers rated AA− or better, and those rated worse than B−, because the number of such observations is small.
- Dummy variables for changes of the borrower's Moody's rating during the year following the loan origination date for that part of the sample we are able to match to the Moody's database. The omitted category is no change. We include migration variables to at least partly control for likely defects of agency ratings as indicators of credit risk: (1) Agency ratings alone may be incomplete descriptors of credit risk, as such ratings represent long-run average or stress scenario views of credit risk that often do not reflect shorter-term variations in risk that may be priced by lenders; (2) ratings are often described as somewhat stale indicators; and (3) banks may possess private information about borrower credit quality beyond that possessed by the agencies. Estimated coefficients imply that loan spreads reflect some of the information that later appears as downgrades and upgrades. Results are qualitatively similar if the base rating used in computing migrations is dated 3 months after the loan origination date, implying that the measured effects are due more to banks having private information than to stale ratings. Coefficients are somewhat smaller in absolute value when the horizon for migration is 2 years rather than 1, implying that banks' ability to anticipate credit quality changes decreases with the time horizon. The dummy for "no migration information" takes a value of one for loans to borrowers that we were unable to match to the Moody's database. Migration rates are similar for loans issued in the U.S. and European loan markets (not shown in tables). If dummies that interact "European market" with migration dummies are included, the only statistically significant coefficients are for downgrades of two or three ticks and of four or more ticks, and these have opposite signs. We view this as evidence that ex ante pricing of migration is similar in the two markets.
- Dummy variables for the year of loan origination, with 1992 the omitted category. Estimated coefficients imply that relative to 1992, 1993–1998 were years of lower expected credit risk, but spreads moved higher beginning in 1999, coincident with increased corporate bond default rates. These results are consistent with known variation in expected default rates by grade at short to medium horizons.
- The natural logarithm of the face amount of the loan commitment expressed in U.S. dollars. Larger loans typically carry lower spreads, all

Table VII

Base Factor Model Specification

The dependent variable in OLS regressions is the all-in spread on outstanding loan balances. Coefficients of particular interest are those on the "European market" dummies (which indicate loans issued there). Coefficients shown in the bottom panel are from the full regression sample; the remainder are from the dollar-denominated subsample. All independent variables are dummies except the log of loan size. Rating migrations are measured from the loan contract date to one year after the contract date. Only loans to borrowers rated A+ or riskier and B– or better on the loan contract date are included. "Investment Grade" is A+ to BBB– in this context. "Junk Grades" are BB+ to B–. The row labeled "Ho: 1992–1998 = 1999–2002" reports *p*-values for a test of the null hypothesis of equality of the coefficients on the two indicator values for issuance in the European market during 1992 through 1998 and 1999 through 2002, respectively.

	(A) All Grades		(B) Investment Grade		(C) Junk Grades	
Independent Variable	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value
Intercept	82.85	<0.0001	78.48	<0.0001	172.99	<0.0001
European market 1992–1998	−25.39	<0.0001	−25.16	<0.0001	−50.72	<0.0001
European market 1999–2002	−35.79	<0.0001	−15.76	0.0004	−46.08	0.0020
H0: 1992–1998 = 1999–2002		0.1363		0.0815		0.7930
Year = 1993	−1.78	0.6224	−8.52	0.0260	2.85	0.5950
Year = 1994	−15.88	<0.0001	−16.62	<0.0001	−16.83	0.0015
Year = 1995	−18.81	<0.0001	−21.74	<0.0001	−17.12	0.0017
Year = 1996	−22.10	<0.0001	−21.56	<0.0001	−20.19	0.0002
Year = 1997	−29.79	<0.0001	−27.42	<0.0001	−29.96	<0.0001
Year = 1998	−10.59	0.0020	−10.71	0.0037	−7.81	0.1233
Year = 1999	21.85	<0.0001	5.18	0.1467	33.34	<0.0001
Year = 2000	36.32	<0.0001	10.17	0.0038	60.02	<0.0001
Year = 2001	37.90	<0.0001	10.31	0.0031	68.90	<0.0001
Year = 2002	45.46	<0.0001	5.89	0.0934	89.04	<0.0001
Borrower rated A	−1.26	0.7035	0.97	0.6627		
Borrower rated A–	4.49	0.1887	7.59	0.0009		
Borrower rated BBB+	16.08	<0.0001	22.83	<0.0001		
Borrower rated BBB	32.02	<0.0001	38.74	<0.0001		
Borrower rated BBB–	51.03	<0.0001	57.56	<0.0001		
Borrower rated BB+	78.01	<0.0001				
Borrower rated BB	117.56	<0.0001			37.87	<0.0001
Borrower rated BB–	136.72	<0.0001			54.86	<0.0001
Borrower rated B+	167.42	<0.0001			82.97	<0.0001
Borrower rated B	178.33	<0.0001			90.45	<0.0001
Borrower rated B–	184.84	<0.0001			101.84	<0.0001
No migration information	3.08	0.0237	10.26	<0.0001	−3.85	0.0759
Rating worsens 1 tick	8.59	0.0008	1.69	0.4965	13.65	0.0010
Rating worsens 2 or 3 ticks	16.89	<0.0001	17.19	<0.0001	17.46	0.0011
Rating worsens 4 or more ticks	40.40	<0.0001	25.91	<.0001	59.73	<0.0001
Rating improves 1 tick	−15.95	<0.0001	−13.14	0.0008	−19.30	<0.0001
Rating improves 2 or 3 ticks	−10.33	0.0861	−27.07	0.0043	−4.40	0.5692
Rating improves 4 or more ticks	−27.16	0.0184	−7.14	0.5641	−43.53	0.0101
Log loan size	−8.60	<0.0001	−5.36	<0.0001	−13.39	<0.0001
Term loan	47.54	<0.0001	45.01	<0.0001	42.86	<0.0001
Bridge or unknown loan type	9.05	0.0008	4.55	0.1009	15.37	0.0002
Takeover loan	16.60	<0.0001	17.11	0.0388	19.28	0.0001
Ship, plane, or SPV finance	−0.13	0.9826	11.55	0.0124	−32.39	0.0139
Project finance loan	−15.97	0.0691	1.03	0.9076	−27.86	0.0404
CP backup loan	−12.40	<0.0001	−7.73	<0.0001	−41.31	<0.0001
Have loan fee info	15.52	<0.0001	14.45	<0.0001	28.97	<0.0001
Multientity obligor	8.82	0.0045	7.57	0.0181	10.64	0.0238
Industry dummies included but omitted to save space						
Adjusted-R^2	0.697		0.441		0.462	
Number of observations	10,948		5,020		5,927	
Full Sample Market Dummy Results						
European market 1992–1998	−20.51	<0.0001	−20.26	<0.0001	−50.06	<0.0001
European market 1999–2002	−41.54	<0.0001	−16.05	<0.0001	−85.14	<0.0001
H0: 1992–1998 = 1999–2002		<0.0001		0.1260		0.0007

else equal. Prior research has suggested several possible reasons, including larger borrowers' greater transparency and access to capital markets (such borrowers typically issue larger loans), and fixed costs of making a loan. More discussion of the impact of firm size appears below.

- A dummy for term loans, which are typically fully drawn at issuance, and a dummy for bridge loans and loans of unknown type. The omitted category is lines of credit. Coefficients imply that loans likely to be at least partly drawn at issuance carry economically significantly higher spreads.
- Dummies for the stated purpose of the loan, including takeover and recapitalization finance, loans financing ships, aircraft, and special-purpose vehicles, project finance, and commercial paper backups. "General corporate purposes" is the omitted category. The results indicate that loans financing takeovers are more risky while backup lines are less risky.
- A dummy for loans for which fees are included in the all-in spread. Fee information is missing in some Loanware records. This variable helps to control for biases arising from such omissions. As noted previously, results are robust to the use of spreads as the pricing measure, that is, ignoring all fees.
- A dummy for loans involving multiple obligors (such obligors are typically affiliated with each other), and a dummy for borrowers that are government-owned or affiliated.
- Twenty-one dummies representing our judgmental coding of the industry of the borrower, not shown in the table to save space. Most coefficients are small and not statistically significant, although state-owned banks and oil industry borrowers pay smaller spreads, and real estate, telecom, and leisure industry borrowers pay higher spreads over this time period.

Coefficients on almost all the aforementioned variables (apart from the industry dummies) are statistically and economically significant and are similar across the dollar-denominated and full regression samples.

Estimated coefficients on two dummy variables indicating issuance of a loan in the European market, shown in the second and third rows of Table VII for the dollar-denominated subsample, are negative and economically and statistically significant, implying that cross-market differences in the incidence of characteristics included in the regression do not account for the smaller spreads observed in Europe. The two variables split the sample period into 1992–1998, during which time spreads were lower by about 25 bps in Europe relative to the United States, and 1999–2002, during which time spreads were about 35 bps lower (the average difference over 1992–2002 is 29 bps, not tabulated). The hypothesis that the coefficients are equal across periods cannot be rejected (p-values appear just below the European market dummy

coefficients in the tables). We split the sample at 1999 because that year marked the beginning of use of the euro, the recent bulge in corporate default rates began in that year, and the Asian and Russian crises were in 1997 and 1998.

Panels B and C of Table VII split the sample into loans to investment grade and junk borrowers, respectively. Coefficients on the European market subsample dummies are again all negative and significant, but they are much more negative for the below-investment grade sector. Values of coefficients on the control variables differ in Panels B and C, but patterns of sign and significance are generally similar.

Results for European market effects in the full regression sample are shown in the bottom panel of Table VII and are similar. Relative to the dollar-denominated subsample, the European market dummy is a bit smaller in the early period and a bit larger in the late period, except for loans to junk-rated borrowers, for which the market effect is much stronger in the later period. As we discuss further below, such instability is due to the small number of late-period junk-rated European market loans.

The factor model imposes the assumption that factors are priced similarly in the U.S. and Europe. Although this assumption can be rejected for some factors, interacting variables with market of issuance leaves the pricing difference across markets unchanged for the mean loan. We also estimate the base case model for a few subsamples, including only term loans, only lines of credit, only loans falling within a given maturity range, and only loans with a given purpose. We found qualitatively similar results for the difference in pricing across markets (not tabulated).

In the remaining tables, we employ a piecewise strategy in adding factors to the model. For each of several hypotheses, we report results of adding to the base-case specification only those factors that are relevant to that hypothesis. This is largely to keep the presentation tractable. Results are similar when a representative set of all factors is included. Detailed tabulations of such results can be found in Carey and Nini (2004).

B. Currency in Which the Loan Is Denominated

The currency in which a loan is denominated could be material for loan spreads if covered interest parity (CIP) does not hold or when expected currency appreciation or depreciation is unusually large. Taylor (1987) offers evidence that CIP holds, and market participants tell us that for the major currencies and LIBOR interest rates, arbitrage is so effective that CIP almost always holds exactly.[20]

[20] An implication of CIP is that banks will be equally willing to lend at the LIBOR rate for any major currency because any difference in LIBOR rates is offset by the forward currency premium (expected appreciation or depreciation). Equivalently, a bank can convert sequences of LIBOR cash

Because the contract spread is an additive constant, the currency in which the spread is paid might influence the level of the spread even if CIP holds. Suppose forward exchange rates suggest the value of the dollar will drop by half relative to the euro over the next year. A 1-year loan paying a fixed 100 bps euro spread will be equivalent to a dollar-denominated loan only if the dollar-loan spread is near 200 bps. In contrast, if the euro spread is 30 bps and expected depreciation is 5%, the equivalent dollar-loan spread is 31.5 bps. Thus, the order of magnitude of the "dollarization" adjustment needed to convert nondollar spreads into dollar-equivalent magnitudes is an empirical matter.

For loans denominated in euro, sterling, French francs, and German marks, we convert contract spreads into dollar-equivalent spreads using forward exchange rates as of the loan contract signing date.[21] The effects are very small: For nondollar loans made in the European market, the mean dollar-equivalent spread is about one-half a basis point (0.41 bps) smaller than the contract spread (median similar). Only seven loans included in the exercise have a dollarization adjustment larger than 2 bps in absolute value. When dollar-equivalent spreads are used in regressions analogous to those reported in Table VII, estimated coefficients are similar to those reported.[22] Thus, as a practical matter in our sample, nondollar spreads can be treated as though they are dollar-denominated.

To relieve any remaining concerns about currency effects, most results reported below are for the subsample of dollar-denominated loans. However, the smaller number of European market loans in this subsample sometimes hinders our ability to test other hypotheses. In such cases, we report results for the full regression sample and, as noted previously, all results for the full sample are tabulated in Carey and Nini (2004).

C. Seniority and Maturity

The base specification omits a number of characteristics that Loanware records, including original maturity, guarantees, secured status, and

flows in one currency into flows in another currency using forward currency contracts, and the two sets of cash flows will have the same present value. Thus, the currency in which a loan's base interest rate is expressed does not matter (as long as it is a major currency).

[21] Almost all U.S. market loans, and about one-half of European market loans, are denominated in U.S. dollars. Of the remaining European market loans, about one-third are in U.K. pounds, about one-quarter in euros, and the remainder are dominated by pre-euro French francs and Deutsche marks, with a smattering of other currencies.

[22] The adjustment is the difference between the contract spread on the nondollar loan and the spread on a dollar loan with equivalent principal, converted at the spot foreign exchange rate, that equates the present value of spread payments on the dollar loan to the present value of spread payments on the nondollar loan, with the latter converted into dollars using forward exchange rates. For this exercise, we assume that all loans are fully drawn at initiation, interest payments are annual, and that principal is repaid at maturity. We discount using risk-free rates, but adding a risk premium equal to the contract spread does not materially affect results.

amortization features. Although we suspect data on guarantees, secured status, and amortization are incomplete, we have no reason to believe the measurement error differs across markets. However, default risk may be related to these loan characteristics. Moreover, the loss given default (LGD) that lenders expect also affects expected losses and spreads, and loan terms such as collateral and guarantees affect the LGD. Thus, systematic differences in such nonprice terms across markets might be responsible for observed differences in pricing.

We omit these variables from the base specification in order to make it relatively free of concerns about simultaneity (these variables are especially likely to be determined simultaneously with spreads). Results when indicator variables for these features are added to the base specification are reported in Table VIII.[23] Coefficients are statistically and economically significant in at least one of the two panels, apart from the bullet loan dummy, but there is no material change in the coefficients on the European market dummies relative to the values in Table VII. As has been found previously (Berger and Udell (1990)), coefficients on the guarantee and collateral variables are generally positive even though such terms are expected to reduce LGD, no doubt because riskier borrowers are more likely to pledge collateral and obtain guarantees.

Systematic differences in LGD between the United States and Europe as a whole, perhaps due to differences in bankruptcy regimes, would influence loan spreads even if nonprice terms of loans were similar. However, several pieces of evidence imply that LGD differences do not explain our pricing puzzle. To explain the observed difference in spreads, LGDs would have to be better for European borrowers (which comprise most of our European market sample) than for U.S. borrowers. However, Moody's Investors Service (2003) offers evidence that they are worse: Mean LGD is about 76% in Europe and about 65% in the United States. Moody's figures are for bonds, not loans, but our conversations with bank regulators, who have conducted unpublished studies of loan LGDs, and with European bankers suggest that LGDs for loans to European firms are higher as well. Moreover, regional differences in LGD should be associated with systematic differences in bond spreads, other things equal, but as noted previously, the available evidence implies bond spreads are similar. Because bankruptcy regimes vary across European countries, it is possible that one or two countries might have low average LGDs and that this could cause our result if many of our sample loans are to borrowers in these countries. However, in this case, we should find that borrower country effects explain the U.S.-Europe spread difference. As we describe further below, we cannot reject the hypothesis of no country effects within Europe.

[23] Estimated coefficients for the European market dummy are qualitatively unchanged if we omit loan size and the term loan and bridge loan dummies from the base specification. These variables may also be endogenous.

Table VIII

Base Case Factor Model Augmented with Maturity, Seniority, Amortization

The dependent variable in OLS regressions is the all-in spread on outstanding loan balances. The specification and data are identical to the base specification reported in Table VII (dollar-denominated subsample) apart from the addition of variables shown in the bottom panel of this table (bullet loan through maturity more than 6 years). A bullet loan is one for which no principal is due before maturity

	(A) Investment Grade		(B) Junk Grades	
Independent Variable	Coefficient	*p*-value	Coefficient	*p*-value
Intercept	67.74	<0.0001	154.16	<0.0001
European market 1992–98	−30.26	<0.0001	−50.21	<0.0001
European market 1999–02	−18.19	<0.0001	−45.77	0.0017
Year = 1993	−6.05	0.1029	3.71	0.4831
Year = 1994	−16.19	<0.0001	−17.23	0.001
Year = 1995	−21.14	<0.0001	−16.91	0.0017
Year = 1996	−22.70	<0.0001	−21.49	<0.0001
Year = 1997	−26.12	<0.0001	−28.73	<0.0001
Year = 1998	−9.23	0.0109	−8.40	0.0944
Year = 1999	7.81	0.0278	33.13	<0.0001
Year = 2000	14.36	<0.0001	61.64	<0.0001
Year = 2001	15.42	<0.0001	71.00	<0.0001
Year = 2002	8.86	0.0118	91.94	<0.0001
Borrower rated A	1.03	0.631		
Borrower rated A−	7.52	0.0007		
Borrower rated BBB+	21.92	<0.0001		
Borrower rated BBB	37.55	<0.0001		
Borrower rated BBB−	54.55	<0.0001		
Borrower rated BB+				
Borrower rated BB			32.65	<0.0001
Borrower rated BB−			45.31	<0.0001
Borrower rated B+			71.44	<0.0001
Borrower rated B			79.81	<0.0001
Borrower rated B−			90.14	<0.0001
No migration info	9.57	<0.0001	−1.75	0.411
Rating worsens 1 tick	2.25	0.3501	14.82	0.0003
Rating worsens 2 or 3 ticks	14.51	<0.0001	19.26	0.0003
Rating worsens 4 or more ticks	23.20	<0.0001	63.09	<0.0001
Rating improves 1 tick	−13.19	0.0005	−18.94	<0.0001
Rating improves 2 or 3 ticks	−32.43	0.0004	−1.35	0.8581
Rating improves 4 or more ticks	−6.60	0.5814	−32.50	0.0504
Log loan size	−4.38	<0.0001	−13.38	<0.0001
Term loan	36.01	<0.0001	36.41	<0.0001
Bridge or unknown loan type	1.21	0.6614	17.14	<0.0001
Takeover loan	11.55	0.1489	14.31	0.0037
Ship, plane, or SPV finance	−0.41	0.9272	−33.72	0.0091
Project finance loan	−28.57	0.0011	−40.26	0.0026
CP backup loan	−5.99	<0.0001	−32.70	0.0012
Have loan fee info	12.84	<0.0001	27.04	<0.0001
Multientity obligor	4.92	0.1152	6.98	0.1311
Bullet loan	−1.89	0.2841	−0.22	0.9399
Guarantee present	10.13	0.0176	−2.72	0.5971
Secured	30.06	<0.0001	23.34	<0.0001
Maturity 1–3 yrs	8.46	<0.0001	18.67	<0.0001
Maturity 3–6 yrs	1.45	0.3118	11.33	0.0058
Maturity more than 6 yrs	33.94	<0.0001	29.40	<0.0001
Adjusted-R^2	0.479		0.483	
Number of observations	5,020		5,927	

D. Time Trend

Figure 2 sheds more light on how average pricing differences across the two markets vary by grade and over time. The figure displays estimates of year-by-year differences in spreads across the two markets in the form of coefficient

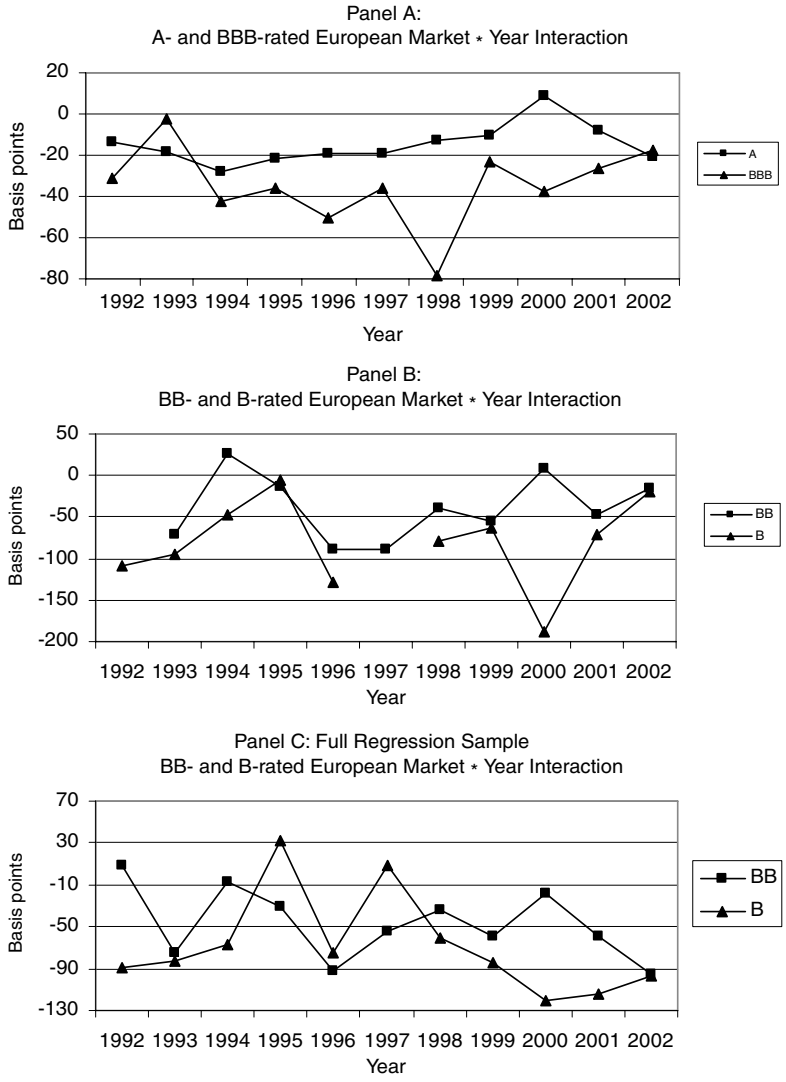

Figure 2. Estimates of mean difference in European and U.S. market spreads by year and grade. Estimated spread differences are the coefficients on dummy variables that interact a European market dummy with year dummies, from separate regressions for loans to borrowers in each grade. Apart from the use of year-specific European market dummies, regression specifications and data are the same as the base specification reported in Table VII, except Panel C uses the full regression sample.

values on interactions of a European market dummy with year-of-issuance dummies from regressions estimated separately for each grade (uninteracted time dummies are also included, so the differences shown in Figure 2 are marginal effects). A and BBB grades are in Panel A, and BB and B are in both Panels B and C, with Panel C providing results for the full regression sample because the smaller dollar-denominated sample has no BB-rated loans in 1992 and no B-rated loans in 1997. Only 3 of the 44 coefficients in Panels A and B are positive. Panel C displays a bit of a trend toward relatively lower European market spreads, but no trend is evident in the other panels. Regression results tabulated in Carey and Nini (2004) provide more formal evidence that there has been no statistically significant trend in average pricing differences over time.

E. Borrowers in One or a Few Countries Do Not Drive the Result

We explore whether pricing differences are driven by loans to borrowers in just one or a few countries. Table IX reports the number of sample loans made in the European market to borrowers from each of several groupings of countries. The relatively small numbers of loans issued by firms in European countries, especially for the junk grades, limits our ability to sharply distinguish among some hypotheses related to nationality. Table X reports results from regressions that include dummy variables for each group of nations for each of the two subperiods, with Panel A limited to investment grade loans and Panel B to junk. All variables from the base specification appear in these regressions, but only the country dummies are shown to save space (results for other variables are similar to those in Table VII). Focusing first on the investment grade case, all country coefficients are negative. Though magnitudes differ, on the whole values are rather similar across nations except that coefficients are more negative for loans to borrowers domiciled in Mediterranean countries and in rest-of-world countries; however, the number of observations is relatively small for these countries (Table IX) and dropping them from the regressions reported in Table VII leaves results qualitatively unchanged. The hypothesis that coefficients are equal for all other country groups is not rejected and the adjusted-R^2 is similar to that in Table VII.

Results are broadly similar for the junk segment (Panel B), but here it is the 1992–2002 loans to Nordic country borrowers that have statistically significantly more negative spreads than other European market loans. Point estimates for the U.K. dummies are less negative than others, but standard errors are high and imposing the dollar-denominated restriction causes an especially large reduction in the number of junk loans to U.K. borrowers. Because there are no loans in the dollar-denominated subsample to Germanic and French junk-rated firms, Panel C of Table X reports results from the full regression sample for junk. Again there is little evidence that loans to borrowers in one or a few countries drive results. Nordic dummy coefficients are not statistically significantly different from others. The Germanic dummy coefficient is positive for 1999–2002, but even the full regression sample includes only two loans

Table IX
Number of European Market Pricing Sample Observations by Country of Borrower

Data for Panel B are from the full regression sample, which is restricted to loans to borrowers in industrialized nations and for which ratings and spreads at issuance are available. Fixed rate loans, loans with no spread information, notes and private placements, and loans with ESOP or debtor-in-possession as the stated purpose of the financing are excluded. Data for Panel A are further restricted to dollar-denominated loans

		1992–1998		1999–2002	
Country	Overall	Inv. Grade	Junk	Inv. Grade	Junk
Panel A: Dollar-Denominated Subsample					
U.K.	107	56	4	35	12
Germanic	21	5	0	15	1
French	36	25	1	10	0
Nordic	93	59	5	21	8
Mediterranean	37	28	2	3	4
U.S.	80	33	40	5	2
Rest of world	30	22	3	4	1
Total European market	404	228	55	93	28
Total U.S. market	10,545	2,231	3,280	2,469	2,565
Panel B: Full Pricing Sample					
U.K.	408	202	27	135	44
Germanic	41	10	4	25	2
French	76	46	3	24	3
Nordic	126	71	6	35	14
Mediterranean	60	42	5	5	8
U.S.	102	40	51	9	2
Rest of world	39	25	3	10	1
Total European market	852	436	99	243	74
Total U.S. market	10,590	2,233	3,292	2,484	2,581

to Germanic below-investment grade firms during 1999–2002. Dropping them from the sample does not materially affect overall results. On the whole, the apparent difference in pricing across markets appears to be a regional or market phenomenon rather than country specific.

Loans issued by U.S. borrowers in the European market are especially interesting because borrower nationality is the same for them regardless of the market in which they issue.[24] Such borrowers paid spreads similar to those paid by European firms during 1992–1998 (that is, smaller than in

[24] Although only about 0.5% of all European market loans are to U.S. borrowers, over 10% of our full pricing sample consists of loans to U.S. borrowers because U.S. firms are far more likely to be rated than European firms.

Table X

Base-Case Factor Model Augmented with Country-of-Borrower Dummies

All base-case regression variables are included but coefficients are not shown to save space (results for such coefficients are similar to those for the base case). The dependent variable in OLS regressions is the all-in spread on outstanding loan balances. The specification and data are identical to the base specification reported in Table VII apart from the addition of variables following the "Borrower nationality dummies" subheading and, in Panel C, the use of the full regression sample. Loan size, loan type, loan purpose, fee information, and multientity obligor dummies are included in the regressions but not shown

	(A) Investment Grade		(B) Junk Grade		(C) Junk, Full Sample	
Independent Variable	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
U.K. borrower 1992–1998	−21.06	0.0002	18.71	0.6014	−18.12	0.1983
U.K. borrower 1999–2002	−18.26	0.0093	−7.10	0.7381	−81.41	<0.0001
Germanic borrower 1992–1998	−23.62	0.2055			−55.69	0.1205
Germanic borrower 1999–2002	−16.75	0.1229			83.07	0.1010
Nordic borrower 1992–1998	−25.80	<0.0001	−67.51	0.0370	−61.29	0.0380
Nordic borrower 1999–2002	−2.30	0.8038	−125.64	<0.0001	−110.07	<0.0001
French borrower 1992–1998	−15.38	0.1161			−30.48	0.4596
French borrower 1999–2002	−4.96	0.7044			−176.38	<0.0001
Mediterranean borrower 1992–1998	−81.71	<0.0001	−63.32	0.2097	−64.01	0.0468
Mediterranean borrower 1999–2002	−76.15	0.0013	−84.08	0.0196	−82.45	0.0220
US borrower 1992–1998	−18.85	0.0089	−60.69	<0.0001	−69.03	<0.0001
US borrower 1999–2002	−18.57	0.3080	−41.35	0.4130	−41.54	0.4106
Rest of world borrowers 1992–1998	−35.88	0.0002	6.27	0.8797	6.30	0.8790
Rest of world borrowers 1999–2002	−61.72	0.0026	−148.07	0.0410	−146.51	0.0430
Adjusted-R^2	0.446		0.464		0.464	
Number of observations	5,020		5,927		6,045	

the U.S. market). During 1999–2002, their spreads were smaller on average but not statistically significantly different from those paid in the United States. However, the full pricing sample and dollar-denominated subsamples include only 11 and 7 European market loans to U.S. borrowers during the 1999–2002 period, so we are reluctant to interpret the 1999–2002 coefficients as evidence of convergence across markets of prices paid by U.S. borrowers.

IV. Pricing: Hypotheses from the Financial Intermediation Literature

The evidence in the previous section strongly suggests that spreads are lower in the European market for otherwise similar loans and borrowers. However, the factor models reported in Tables VII–X control only for the most obvious loan and borrower characteristics. The literature on corporate finance and financial intermediation is rich with reasons why loan markets may depart from the simple homogenous good, competitive market paradigm. In this section, we review several possible explanations for pricing differences and present evidence related to each. Our ability to test some of the explanations is limited by the limitations of available data.

A. Asymmetric Information Effects

Diamond (1984) and James (1987), among many others, argue that banks mitigate problems of asymmetric information. Degryse and Ongena (2005) and Petersen and Rajan (2002) focus on the effect of distance on information costs and lending, and Hadlock and James (2002) note that some firms may choose to issue in higher-cost markets in which their quality is not clearly revealed. Taken together, the body of such work suggests that the identity of lenders may matter, that is, the same borrower might pay different spreads to one set of lenders than to another because of differences in lenders' information about the borrower's credit quality.

If the ability of lenders to mitigate information problems is correlated with differences in lender or borrower nationality, and if lender nationality patterns differ across markets, then observed differences in pricing might be due to asymmetric information effects. We attempt to identify any such effects by adding measures of syndicate "foreignness" to the base-case factor model. Specifically, we use several different combinations of variables to test whether the presence and/or importance in syndicate of lenders with a nationality different from the borrower's matters for spreads and find that it does not. Moreover, in no case do the additional variables have a material effect on the coefficients of the European market dummies.

Our evidence implies that the ability of lenders to manage information problems does not vary with the location of the borrower, which in turn implies that nationality differences per se, or distance per se, are not particularly important

to syndicated loan pricing. A caveat is that this result is for borrowers with credit ratings, which may reduce many information asymmetries.

B. Ex Post Monitoring

Berlin and Mester (1992) and Smith and Warner (1979) suggest that loan covenants and loan renegotiation play an important role in alleviating opportunistic behavior, especially asset substitution. Carey et al. (1993) and Carey, Sharpe, and Post (1998) extend this idea, arguing that differences in lenders' tendency to hold up borrowers during renegotiations, and lenders' reputation for doing so, are an important determinant of the structure of financial markets. A lender with a reputation for agreeing to reasonable contract revisions is preferred by borrowers, other things equal, and hence can charge higher spreads at origination, but such a lender must protect its reputation by avoiding borrowers that will require harsh discipline because such discipline would harm the lender's reputation. It is possible that lenders of different nationality may have renegotiation policies and reputations that differ because of differences in home market law, regulation, and financial system structure. A lender that chooses renegotiation policies that are optimal for its domestic market may essentially offer a different loan product in the eyes of global syndicated loan market borrowers than a lender from another nation, and thus spreads may differ with lender nationality.

This hypothesis might explain cross-market differences in pricing if lender nationality is correlated with pricing, since the market share of lenders varies with lender nationality. However, as Panel A of Table XI shows, when we add variables measuring the fraction of lenders domiciled in the various nationality groups, most coefficients are economically small and statistically insignificant, others are not robustly significant, and the coefficients on the European market dummies are similar to those of the base case (see Carey and Nini (2004) for more details). This is also true when we use the fraction of lead lenders from each nationality (right columns of Table XI). As in Table X, base-case variables are included in the regression but not shown because coefficients are similar to those shown in Table VII.

C. Multiproduct Package Pricing

Market participants often suggest that loan spreads are related to the amount of other business that lending banks do with the borrower (see also Drucker and Puri (2005)). If the incidence of product bundling differs across markets, this might account for the differences in pricing we observe. Although we do not observe other purchases from banks, we expect that any bundling effects would be weaker the larger the number of lenders in the syndicate and the larger the number of small lenders in the syndicate. This is because all syndicate members receive the same contract interest rate spread, yet it seems unlikely that a large number of banks would all achieve similar sales of ancillary business to the same borrower. Moreover, the range of products offered by small banks is

Table XI

Base-Case Factor Model Augmented with Share of Lenders by Nationality

The dependent variable in OLS regressions is the all-in spread on outstanding loan balances. The specification and data are identical to the base specification reported in Table VII apart from the addition of the extra variables shown in this table, but base-specification variables are not shown to save space. Panel A.1 includes all lenders in a syndicate in computing fractions whereas Panel B.1 includes only lead lenders. Panel A.2 includes variables measuring the number of lenders in a syndicate, whereas panel B.2 includes variables measuring only the number of small lenders. "Small" is defined as those that Loanware records as participating in less than 1,000 loans during 1992–2002.

	Investment Grade		Junk		Investment Grade		Junk	
Independent Variable	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value
Panel A: Fraction of Lenders with Each Nationality (U.S. Is Omitted Category)								
	1: Lender Variables: Fraction All Lenders				2: Lender Variables: Fraction Lead Lenders			
European market 1992–1998	−23.84	<0.0001	−49.82	<0.0001	−23.44	<0.0001	−48.91	<0.0001
European market 1999–2002	−15.77	0.0010	−42.45	0.0069	−16.44	0.0008	−45.25	0.0047
U.K.	−6.06	0.4758	−5.44	0.7051	−2.62	0.5710	0.38	0.9737
Mediterranean	−67.84	<0.0001	−51.70	0.1916	−38.63	0.2288	28.45	0.6842
French	18.18	0.0074	21.15	0.0404	22.82	0.0007	2.57	0.7313
Germanic	−4.15	0.4371	22.71	0.0174	1.39	0.7003	20.87	0.0076
Nordic	4.00	0.6664	−6.99	0.6297	−4.29	0.5184	−26.46	0.0094
Japanese	−3.94	0.4849	−49.52	<0.0001	−24.73	0.0002	24.50	0.1910
Rest of world (non-U.S.)	0.16	0.9765	−34.50	<0.0001	0.92	0.8155	5.77	0.2526
Adjusted-R^2	0.443		0.466		0.443		0.463	
Number of observations	5,020		5,927		5,018		5,926	
Panel B: Syndicate Size and Composition								
	1: Syndicate Size				2: Syndicate Composition: Small Lenders			
European market 1992–1998	−25.53	<0.0001	−50.35	<0.0001	−26.48	<0.0001	−51.43	<0.0001
European market 1999–2002	−16.32	0.0003	−44.74	0.0027	−17.64	<0.0001	−48.58	0.0010
2 lenders	−2.09	0.3790	−1.75	0.5709				
7–20 lenders	−1.99	0.1894	−6.04	0.0088				
More than 20 lenders	3.99	0.0414	6.73	0.0328				
1 small lender					1.23	0.4285	−5.49	0.0389
2 or 3 small lenders					7.59	<0.0001	−3.15	0.2246
4 or more small lenders					8.72	<0.0001	22.79	<0.0001
Adjusted-R^2	0.44		0.46		0.44		0.47	
Number of observations	5,020		5,927		5,020		5,927	

typically narrower than at large banks. Thus, this hypothesis implies that loans involving more small banks should carry higher spreads.[25]

To control for potential package pricing effects, we amend the base-case model to include dummy variables for the number of lenders in the syndicate and dummy variables for the number of small lenders in the syndicate. Our measure of bank size is based on the number of Loanware database loans in which the lender and its parent or affiliates participate. A small lender is one that is party to less than 1,000 loans.[26]

Results for these variants are reported in Panel B of Table XI. Coefficients on the more-than-20-lenders dummy variables are positive and significant for both investment grade and junk regressions, but the 7-to-20-lenders coefficient is negative and significant for junk loans (three to six lenders is the omitted category). At best, this evidence provides weak support for the existence of package pricing effects in general, but the coefficients are rather small economically, and European market dummy coefficients are essentially unchanged from the base case.

D. Rating Agencies Apply Different Standards to Different Borrowers

If rating agencies grade non-U.S. borrowers as riskier than equivalent-risk U.S. borrowers, we would expect to see lower average spreads in the European market, which is dominated by European borrowers, than in the U.S. market. In this case, European borrowers assigned a given agency grade would be safer than U.S. borrowers in the same grade and would borrow at lower spreads, presuming the market perceives and prices risk correctly.

This explanation is difficult to test directly because it amounts to a hypothesis of omitted variable bias in our factor model results, and a perfect proxy for such bias is not available. Moreover, our sample of European loans is too small to provide meaningful measures of ex post default rates by grade, which in a large sample and in the long run should reveal any bias. However, several pieces of evidence weigh against this hypothesis:

- Ammer and Packer (2000) find no evidence of geographic differences in default rates.
- We include a measure of credit risk that should be unaffected by any rating bias. We match the full pricing sample with a database of month-end KMV EDFs for North American, European, and Asian firms from 1999 and find EDFs for about 60% of observations. When EDF is included in base-case regressions using this reduced sample, the coefficient is positive and significant, but the European market dummy coefficients are similar to values

[25] Although some upfront fees may differ across lenders in a syndicate, such fees typically depend on the lender's share of the loan. If small lenders are more likely to take a small share, they will receive lower fees and still not be compensated for receiving little ancillary business.

[26] Only 88 banks are large lenders by this criterion, but they account for more than 75% of the appearances of lenders in syndicates. We also try other lender size measures, with qualitatively similar results (see Carey and Nini (2004)).

obtained in the same subsample without EDF. Rating dummy coefficients also remain similar. KMV's model is calibrated using defaults of U.S. firms, so it is possible that the calibration may not be as appropriate for European firms as U.S. firms. However, even if biased, EDFs are unlikely to have the same biases as ratings, so including EDFs in the model should reduce the European market effect if the effect is an artifact of rating biases.

- Average bond spreads by grade should differ across the two markets if ratings are biased, but Mahajan and Fraser (1986) find no difference and our simple empirical exercise discussed previously also finds little difference.
- U.S. firms should pay the same spreads in the European market and in the U.S. market, but results presented previously imply otherwise.
- If ratings are biased by borrower nationality, it seems likely the bias would be smaller for the industrialized European nations that form the bulk of our pricing sample, and especially for the United Kingdom, which has a market-oriented financial system similar to that in the United States. Thus, we would expect differences in European- and U.S.-market simple mean spreads in Table V to be larger when emerging market borrowers are included in the sample, as in Panel B of Table V, but in fact they are smaller.
- Parameter estimates for rating dummies reported in Table VII imply that, to be the main explanation, any difference in rating agency standards across markets must vary with credit quality and must be quite large. For junk borrowers, the cross-market difference is about 50 bps on average, which is approximately the difference between the coefficients on BB- and B- dummies, or three ticks on the ratings scale. We believe this to be an implausibly large bias.

E. Firm Size and Borrower Financial Characteristics

A number of hypotheses discussed above might be consistent with the assertion that larger firms should pay smaller spreads, other things equal. In our pricing sample, European market borrowers are larger on average than U.S.-market borrowers, so the cross-market price difference we find might be due to omission of firm size. Loan size, while highly correlated with firm size in other studies, is an imperfect proxy. Only loan size is available for our full sample. However, we obtain financial statement data for as much of the 1999–2002 KMV EDF subsample as possible, including total assets, market-to-book value of assets, and measures of cash flow, profitability, and book leverage. Inclusion of a variety of combinations of such variables in the factor model does not have a material effect on the price difference across markets.

Results for one variant appear in Table XII. The left panel shows results for the base specification in this much smaller subsample.[27] The right panel shows results when EDF and financial statement variables are included. Firm size

[27] We use loans denominated in all currencies for this exercise because imposing the criteria that EDF be available, financial ratios be available, and the loan be dollar-denominated leaves

Table XII

Base-Case Factor Model with EDF and Financial Statement Variables, Reduced Sample

The dependent variable in OLS regressions is the all-in spread on outstanding loan balances. The specification is identical to the base specification reported in Table VII apart from the addition of variables following the "Financial statement variables and EDF" subheading. The full regression sample (not restricted to dollar-denominated loans) is used because adding the dollar-denominated restriction would leave only 64 European market loans in the sample. Panel A shows base-case results for the reduced sample for which values of such variables are available, for comparison with results when such variables are included (Panel B). All base-case variables are included in the regressions but not shown to save space.

	Panel A: Base Specification on Subsample				Panel B: Financials and EDF			
	Investment Grade		Junk		Investment Grade		Junk	
Independent Variable	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value
Intercept	58.78	<0.0001	152.86	<0.0001	68.85	<0.0001	168.44	<0.0001
European market 1999–2002	−16.70	<0.0001	−76.56	0.0001	−12.50	0.0030	−87.11	<0.0001
Year = 2000	3.52	0.2577	27.89	<0.0001	2.47	0.4132	31.41	<0.0001
Year = 2001	5.69	0.0645	46.07	<0.0001	4.42	0.1415	49.96	<0.0001
Year = 2002	−0.65	0.8339	63.26	<0.0001	−0.29	0.9226	64.60	<0.0001
Borrower rated A	5.61	0.1917			3.65	0.3833		
Borrower rated A−	15.23	0.0007			12.65	0.0039		
Borrower rated BBB+	34.59	<0.0001			30.96	<0.0001		
Borrower rated BBB	57.77	<0.0001			46.95	<0.0001		
Borrower rated BBB−	92.68	<0.0001			80.33	<0.0001		
Borrower rated BB+								
Borrower rated BB			25.03	0.005			23.78	0.0066
Borrower rated BB−			54.54	<0.0001			51.25	<0.0001
Borrower rated B+			90.64	<0.0001			83.13	<0.0001
Borrower rated B			100.95	<0.0001			87.55	<0.0001
Borrower rated B−			143.88	<0.0001			119.33	<0.0001

(continued)

Table XII—*Continued*

	Panel A: Base Specification on Subsample				Panel B: Financials and EDF			
	Investment Grade		Junk		Investment Grade		Junk	
Independent Variable	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value
No migration info	10.90	<0.0001	13.93	0.0097	10.06	<0.0001	11.96	0.0281
Rating worsens 1 tick	−1.67	0.6267	23.97	0.0007	−3.11	0.3521	22.72	0.0013
Rating worsens 2 or 3	16.04	0.0004	33.65	0.0001	4.83	0.2849	21.50	0.0166
Rating worsens 4 or more	21.57	0.0003	87.44	<0.0001	14.99	0.0108	69.13	<0.0001
Rating improves 1 tick	−29.52	<0.0001	−15.29	0.1436	−23.12	0.0010	−7.80	0.4542
Rating improves 2 or 3	−30.08	0.0548	33.84	0.0635	−22.68	0.1350	43.85	0.0153
Rating improves 4 or more	−7.42	0.7556	54.70	0.1179	−10.77	0.6402	42.26	0.2217
Log loan size	−4.79	<0.0001	−7.28	0.0009	−4.35	0.0001	−5.89	0.0198
Financial statement variables and EDF								
EDF					7.60	<0.0001	1.50	0.0027
Log borr. total assets					−2.09	0.0714	−4.05485	0.1193
Debt-to-assets					10.02	0.1563	11.0083	0.3468
Market-to-book					−0.63	0.6363	−5.34	0.0389
Negative ROA dummy					−1.40	0.8515	40.08	<0.0001
ROA 1st quartile					13.66	<0.0001	26.23	<0.0001
ROA 2nd quartile					2.20	0.4511	11.35	0.0530
ROA 4th quartile					2.78	0.3240	11.53	0.0717
All other base specification variables are included but not shown to save space								
Adjusted-R^2	0.493		0.420		0.528		0.443	
Number observations	1,642		1,212		1,642		1,212	

is represented by the log of total assets, leverage by the ratio of total debt to assets, cash flow by the ratio of EBITDA to assets (ROA), and market-to-book by the ratio with book assets in the denominator and a numerator measured as assets less book common equity plus market value of common equity. We find a materially nonlinear relationship for cash flow, which is represented by dummies that correspond to each quartile plus a dummy for observations with negative ROA. Each variable is statistically significant in some specifications or subsamples, but the price difference across markets remains statistically and economically significant.

F. Regulation

McCauley and Seth (1992) argue that through the early 1990s, Japanese banks had a lower cost of capital than other banks because their regulators permitted them to operate with smaller capital ratios. However, the Basel Accord harmonized capital regulation beginning in 1992. Because other bank regulations differed across nations even within Europe during our sample period, if regulations are responsible for the price differences we observe, then the lender nationality dummies used to investigate the monitoring explanation should pick them up. That is, regulation should cause lenders from a given nation to behave differently everywhere, so lender nationality should be significantly correlated with price differences. Our results do not support this hypothesis. As we note previously, including dummy variables for lender nationality does not materially affect the explanatory power of the factor model.

A number of European banks are wholly or partly state-owned or are cooperatives. Such banks may not have profit as their primary objective and some enjoy government guarantees of their liabilities. For European banks participating in 50 or more of our sample loans, we identify those that are state-owned or cooperatives and include in regressions a dummy for any such banks in the syndicate and a variable giving the share of such banks in the syndicate. Neither variable is statistically significant and the European market effect on spreads is not much affected (not shown in tables).

G. Portfolio Diversification Effects

The contribution of a loan to a bank's portfolio credit risk posture (equivalently, the systematic risk it bears) may affect the loan's interest rate spread in a manner that differs systematically with nationality. The conventional benchmark case in which all investors in an asset class hold the world portfolio for that class is not realistic for banks because parts of their portfolios are associated with domestic small business and consumer loans originated through branch networks. Thus, banks tend to have large core exposures to home country credit

only 64 European market loans in the sample. If we impose all these criteria, the coefficients on the European market dummy remain negative but are no longer statistically significant, with or without the addition of the EDF and financial ratio variables.

risk, but the degree of such core exposure may differ across nations with the share of core loans in bank portfolios. Because a bank's reservation price for extending a loan should depend on the extent to which the loan diversifies or concentrates its portfolio credit risk, and a borrower's nationality may affect concentration differently for banks in different nations, spreads may differ systematically for different pairings of lender and borrower nationality. This hypothesis is difficult to test directly because banks' portfolios of credit risk positions are unobservable, but two pieces of circumstantial evidence do not support it. First, as noted previously, if the syndicated loan market is a primary vehicle for diversifying credit risk from branch-originated loans, one would expect banks to prefer foreign to domestic borrowers in the syndicated loan market, but in fact lenders display home bias.

Second, U.S. lenders should be willing to accept smaller spreads on loans made in the European market, and European lenders should accept smaller spreads in the U.S. market. However, as Table XI shows and as we discuss in Section IV.B, coefficients on the fraction of lenders with each nationality interacted with the market dummy often do not differ significantly within a nationality, suggesting that lenders do not vary their hurdle rates by market. Moreover, coefficients should be smaller (more negative) for the interaction not associated with the lender's home market, but the opposite occurs in all the cases in which the difference is significant.

H. Legal Regime

La Porta et al. (1997) and others suggest that a country's legal tradition influences the nature and efficiency of its financial system. Legal tradition rather than nationality per se might drive some of the nationality-related explanations presented previously. However, when we group borrowers by the legal tradition of their country of domicile (using Table II of La Porta et al.), we find results qualitatively similar to those using our groupings of borrower nationality.[28]

I. Increased Competition Associated with Evolution Toward a Single European Market

Santos and Tsatsaronis (2003) find substantial changes in underwriting costs borne by issuers in European bond markets as the euro came into use. They argue that reduced legal and regulatory barriers increasingly favor underwriters operating at large scale, leading to greater competition between established underwriters and new entrants as each attempts to be among the survivors. Although U.S.-based commercial and investment banks have increased their

[28] Syndicated loan contracts often specify that either New York law or U.K. law will govern disputes among the parties to the contract, so most such disputes outside of bankruptcy will be resolved under laws in the English tradition, perhaps limiting the relevance of the borrower's home country legal tradition. In the event of bankruptcy, most borrowers file in their home country and local legal tradition may be more relevant. However, in this case, either the legal tradition or the borrower nationality dummies should be significant, and they are not.

activities in the European market over the past decade, increased competition associated with European integration does not explain the fairly stable difference in investment grade loan spreads that we observe since 1992.

J. Tax and Liquidity Effects

Recent empirical analyses of bond spreads, such as Elton et al. (2001) and Collin-Dufresne, Goldstein, and Martin (2001) find important roles for tax and liquidity effects as well as for unknown factors. The favorable U.S. tax treatment of interest on U.S. Treasury securities that is the primary source of most tax effects in empirical analyses of bond spreads is not relevant in our exercise, where all spreads are relative to LIBOR. Conventional noise in measured prices due to bid–ask bounce or thin trading is also not a problem because we use loan contract spreads. Differences across markets in the liquidity of secondary markets for loans are also unlikely to explain the price difference we observe: Even the relatively large loans we examine were almost completely illiquid in both markets for most of our sample period and, to the extent that secondary market liquidity is developing, our conversations with market participants imply more rapid development in the United States than in Europe.

K. Summary Comparison

Table XIII summarizes the impact that a full set of control variables has on the difference between average spreads in Europe and the United States. Panel A shows simple mean differences without any controls for the dollar-denominated subsample, and Panel B shows the European market dummy coefficient estimates from a regression model run separately for loans to borrowers in each grade that includes nonprice terms, differences in borrower or lender nationality, fraction of syndicate lenders with each nationality, and the number of lenders in the syndicate. Comparing Panels A and B, differences in spreads between the U.S. and European markets grow larger with the addition of controls more often than they shrink. Statistical significance of the differences is often absent for the 1999–2002 period, but this is due to the smaller number of observations in the dollar-denominated subsample. Panel C shows regression results for the full regression sample. Here statistical significance of spread differences is strong in both subperiods for all loans but those to A-rated borrowers. A comparison of Panels B and C reveals that point estimates of average spread differences are similar on the whole for the two samples. Differences for loans to junk-rated borrowers during 1999–2002 change the most, and as noted previously, the number of such loans made in the European market is small.

Although test results in the last column of Panel B of Table XIII suggest that we should reject hypotheses that average spread differences are the same during 1999–2002 as during 1992–1998 for the A and B grades, the evidence of a general trend toward smaller differences is weak in the full sample (Panel C) and not robust to other variations, as described in more detail in Carey and Nini (2004).

Table XIII
Average Spread Differences without and with Controls (Europe-United States)

Panels A and B display means of European market less U.S. market spreads without controlling for borrower and loan characteristics and with controls, respectively, for the dollar-denominated subsample. Panel C shows differences with controls for the full regression sample. In Panels B and C, differences are the coefficients on European market dummy variables for each time period from base-specification regressions augmented with variables representing nonprice terms of loans, differences in borrower or lender nationality, fraction of syndicate lenders with each nationality, and the number of lenders in the syndicate. The columns with labels beginning with H0 report *p*-values for hypothesis tests that estimated differences equal zero (second and fourth columns) and for a test that early-period and late-period differences are identical (far right column).

	E: 1992–1998		L: 1999–2002		
Grade	Difference	H0: diff = 0	Difference	H0: diff = 0	H0: E = L
Panel A: Without Controls, Dollar-Denominated Subsample					
A	−3	0.1944	8	0.0687	0.0258
BBB	−26	0.0005	−14	0.1327	0.3329
BB	−49	0.0008	−31	0.1191	0.4693
B	−59	0.0005	−106	<0.0001	0.1161
Panel B: With Controls, Dollar-Denominated Subsample					
A	−26	<0.0001	−12	0.0102	0.0040
BBB	−50	<0.0001	−28	0.0058	0.0474
BB	−35	0.0088	−21	0.3138	0.531
B	−74	<0.0001	−13	0.6702	0.0874
Panel C: With Controls, Full Regression Sample					
A	−16	<0.0001	−7	0.0522	0.0069
BBB	−40	<0.0001	−28	0.0003	0.1239
BB	−37	0.0021	−58	0.0006	0.2204
B	−57	<0.0001	−95	<0.0001	0.0311

V. Concluding Remarks

We offer evidence that syndicated corporate loan spreads are significantly smaller in Europe than in the United States, suggesting that a market location factor is correlated with economically important components of the intermediation process. Systematic differences across the two markets in loan and borrower characteristics do not appear to account for the pricing difference. Importantly, nationality per se, such as borrower or lender nationality within Europe, is not highly correlated with spreads when controls for risk are included. The relatively small number of U.S. firms that issue in the European market pay European market spreads, not U.S. market spreads. These and other facts cast doubt on many potential explanations drawn from the literature on financial intermediation, including explanations focusing on differences in asymmetric information and moral hazard, creditor rights, multiproduct pricing discounts,

rating dynamics, and regulation. While many of our proxy variables are correlated with loan spreads, differences in spreads across the two markets remain. We also find little evidence of convergence of spreads across markets as time has passed.

We describe the pricing difference as a puzzle because its size and persistence is suggestive of an equilibrium phenomenon—a pure failure of arbitrage on this scale by the large, sophisticated participants in the syndicated loan market is difficult to accept. Several avenues of future research might resolve the puzzle and enhance our understanding of corporate finance and financial intermediation.

One avenue might focus on why borrowers do not cross borders. We find that borrowers domiciled in a region that hosts a major syndicated loan market usually issue there. However, borrowers domiciled elsewhere generally choose to issue in Europe, where spreads are lower. This suggests that issuing out of the home market is costly, potentially explaining why so few U.S. firms issue in Europe, which is an important element of the puzzle.

Second, we show that lender portfolios display significant home bias. Our paper contributes to the home bias literature by revealing substantial pricing differences that appear to persist in part because of home bias. Research that reveals how home bias interferes with arbitrage by lenders, and why home bias persists in equilibrium, might also help solve our puzzle.

Note, however, that a full explanation of the loan pricing puzzle must explain not only why price differences are not competed away by lenders and borrowers, but also what causes the differences to open up. Thus, our evidence indicates that economically important aspects of financial intermediation and corporate finance remain to be discovered. That is, loans made in the European and U.S. markets may differ materially along some dimension that is relevant to price but that has received little attention. One possibility is that important mechanisms have not yet been modeled. Another is that mechanisms already identified in the literature work differently in Europe and the United States. If the latter is the case, research that reveals how and why the workings of such mechanisms depend on region (but not on nationality per se) would be valuable.

REFERENCES

Adam, Klaus, Tullio Jappelli, Annamaria Menichini, Mario Padula, and Marco Pagano, 2002, Anayze, compare and apply alternative indicators and monitoring methodologies to measure the evolution of capital market integration in the European Union, Working paper, University of Salerno.

Ammer, John, and Frank Packer, 2000, How consistent are credit ratings: A geographic and sectoral analysis of default risk, *Journal of Fixed Income* 10, 24–30.

Angbazo, L., J.P. Mei, and A. Saunders, 1998, Credit spreads in the market for highly leveraged transaction loans, *Journal of Banking and Finance* 22, 1249–1282.

Ashcraft, Adam, and Don Morgan, 2003, Using loan rates to measure and regulate bank risk: Findings and an immodest proposal, *Journal of Financial Services Research* 24, 181–200.

Bae, Kee-Hong, and Vidhan K. Goyal, 2003, Property rights protection and bank loan pricing, Working paper, Korea University.

Berger, Allen N, Qinglei Dai, Steven Ongena, and David Smith, 2003, To what extent will the banking industry be globalized? A study of bank nationality and reach in 20 European nations, *Journal of Banking and Finance* 27, 383–415.

Berger, Allen N., and Gregory F. Udell, 1990, Collateral, loan quality and bank risk, *Journal of Monetary Economics* 25, 21–42.

Berlin, Mitchell, and Loretta J. Mester, 1992, Debt covenants and renegotiation, *Journal of Financial Intermediation* 2, 95–133.

Buch, Claudia M., John C. Driscoll, and Charlotte Ostergaard, 2004, Cross-border diversification in bank asset portfolios, FEDS Working paper 2004-26, Federal Reserve Board.

Carey, Mark, and Gregory Nini, 2004, Is the corporate loan market globally integrated: A pricing puzzle, IFDP Working paper 813, Federal Reserve Board.

Carey, Mark, Stephen Prowse, John Rea, and Gregory Udell, 1993, The economics of the private placement market: A new look, *Financial Markets, Institutions and Instruments* 2, 1–113.

Carey, Mark, Steven A. Sharpe, and Mitchell Post, 1998, Does corporate lending by banks and finance companies differ? Evidence on specialization in private debt contracting, *Journal of Finance* 53, 845–878.

Casolaro, Luca, Dario Focarelli, and Alberto Franco Pozzolo, 2003, The pricing effect of certification on bank loans: Evidence from the syndicated credit market, Working paper, Banca d'Italia.

Collin-Dufresne, Pierre, Robert S. Goldstein, and J. Spencer Martin, 2001, The determinants of credit spread changes, *Journal of Finance* 51, 2177–2207.

Degryse, Hans, and Stephen Ongena, 2005, Distance, lending relationships and competition, *Journal of Finance* 60, 231–266.

Dennis, Steven, and Donald Mullineaux, 2000, Syndicated loans, *Journal of Financial Intermediation* 9, 404–426.

Diamond, Douglas W., 1984, Financial intermediation and delegated monitoring, *Review of Economic Studies* 51, 393–414.

Drucker, Steven, and Manju Puri, 2005, On the benefits of concurrent lending and underwriting, *Journal of Finance* 60, 2763–2799.

Elton, Edwin J., Martin J. Gruber, Deepak Agrawal, and Christopher Mann, 2001, Explaining the rate spread on corporate bonds, *Journal of Finance* 56, 247–278.

Flood, Robert P., and Andrew K. Rose, 2003, Asset integration redux: Methodology and mystery, Working paper, University of California at Berkeley.

Hadlock, Charles, and Christopher James, 2002, Do banks provide financial slack? *Journal of Finance* 57, 1383–1419.

Henderson, Brian J., Narasimhan Jegadeesh, and Michael S. Weisbach, 2003, World markets for raising new capital, NBER Working paper 10225, Emory University.

Houston, Joel, and Christopher James, 1996, Bank information monopolies and the mix of private and public debt claims, *Journal of Finance* 51, 1863–1889.

James, Christopher, 1987, Some evidence on the uniqueness of bank loans, *Journal of Financial Economics* 19, 217–235.

Karolyi, Andrew, and Rene Stulz, 2002, Are financial assets priced locally or globally? in George Constantinides, Milton Harris, and René Stulz, eds.: *The Handbook of the Economics of Finance* (North Holland, Amsterdam).

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny, 1997, Legal determinants of external finance, *Journal of Finance* 52, 1131–1150.

Mahajan, Arvind, and Donald R. Fraser, 1986, Dollar Eurobond pricing and U.S. bond pricing, *Journal of International Business Studies* 17, 21–37.

McCauley, Robert N., and Rama Seth, 1992, Foreign bank credit to US corporations: The implications of offshore loans, Federal Reserve Bank of New York, *Quarterly Review* 17, Spring, 52–65.

Merton, Robert, 1974, On the pricing of corporate debt: The risk structure of interest rates, *Journal of Finance* 29, 449–470.

Moody's Investors Service, 2003, Special comment: Recovery rates on defaulted corporate bonds and preferred stocks, 1982–2003.

Petersen, Mitchell, and Raghuram Rajan, 2002, Does distance still matter: The information revolution in small business lending, *Journal of Finance* 57, 2533–2570.

Santos, Joao, and Kostas Tsatsaronis, 2003, The cost of barriers to entry: Evidence from the market for corporate euro bond underwriting, BIS Working paper No. 134, Bank for International Settlements.

Smith, C., and J. Warner, 1979, On financial contracting: An analysis of bond covenants, *Journal of Financial Economics*, 117–161.

Taylor, M., 1987, Covered interest parity: A high-frequency, high-quality data study, *Economica* 54, 429–438.