Cross-listed Bonds, Information Asymmetry, and Conservatism in Credit Ratings

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Abstract

Extending prior studies that concentrate on the contracting explanation for rating conservatism, we propose information asymmetry as an additional explanation for rating conservatism. Because information asymmetry is likely to be higher for cross-listed bonds than for U.S. bonds, we investigate whether cross-listed bonds are rated more conservatively than U.S. domestic bonds. Controlling for issue, issuer, and country-specific factors, we find that cross-listed bonds have lower ratings at issuance than U.S. domestic bonds. Further, the conservative rating bias is not a temporary phenomenon; cross-listed bonds are less likely to be upgraded, receive less frequent upgrades, and they take longer to be upgraded. Because lower ratings might also reflect higher default risk based on agencies' private information, we conduct additional tests to discriminate between the rating conservatism and private information explanations. We find that ratings of cross-listed bonds are more likely to raise false alarms, are less likely to miss future defaults, and are associated with a lower spread on the issuance date. These tests are consistent with ratings conservatism and inconsistent with the private information explanation.

Keywords: *cross-listed bonds; credit ratings; rating conservatism; information asymmetry*

JEL classification: M41; G30; N20

Data Availability: *The data used in this study are publicly available from the sources identified in the text.*

Cross-listed Bonds, Information Asymmetry, and Conservatism in Credit Ratings

1. Introduction

The rating industry has been under increasing scrutiny since the accounting scandals of Enron and WorldCom, and the recent financial crisis has revived this scrutiny. Critics argue that the issuer-pay model creates significant conflicts of interest thereby leading to inflated ratings (Bolton, Freixas and Shapiro 2012, Skreta and Veldkamp, 2009). Rating agencies, on the other hand, argue that reputational concerns mitigate potential agency conflicts arising from user-pay models thereby sustaining high ratings quality.[1] Given the mixed evidence on rating agencies' incentive structure and ratings quality, we examine an important rating attribute, i.e., rating conservatism, which could shed some light on this controversial but crucial debate on ratings quality.

While the theory and evidence on conservatism in financial reporting is extensive (Watts 2003 a&b), the application of the conservatism principle in other areas such as credit ratings has been limited. One exception is Beaver, Shakespeare and Soliman (2006), which relies on the debt-contracting role of certified credit ratings to explain rating conservatism. We propose information asymmetry as an additional explanation for rating conservatism. Because information asymmetry is likely to be higher for cross-listed bonds than for U.S. bonds, we investigate whether cross-listed bonds are rated more conservatively than U.S. domestic bonds.

The maintained assumption in our study is that rating agencies have an asymmetric loss function because reputational costs are higher when an issuer defaults but ratings indicate otherwise than when an issuer has a higher credit quality relative to its ratings (Beaver et al. 2006). Consequently, rating agencies are likely to be conservative, i.e., they would require a

[1] For instance, S&P claimed that ''reputation is more important than revenues''(Meltz, 2007, p.2). Several academic studies also provide evidence that reputation concern motivates credit rating agencies to improve ratings quality (e.g., Blume et al. 1998; Cheng and Neamtiu 2009).

higher verification standard to report favorable ratings than unfavorable ratings. Building on this line of literature, we contend that ratings are more conservative for issuers with relatively high information asymmetry. Compared to issuers with low information asymmetry, assessing the credit-worthiness of firms with high information asymmetry is generally more challenging. Because the damage to their reputation is particularly high when rating agencies underestimate the default risk (Type II error) than when they overestimate default risk (Type I error), they are more likely to impose a higher standard when reporting favorable ratings than when reporting unfavorable ratings for bonds from issuers with high information asymmetry. Thus, ratings are more conservative for issuers with higher information asymmetry.

Cross-listed bonds provide a unique setting to test our hypothesis that ratings are more conservative when information asymmetry is high. Prior studies suggest that information asymmetry is higher for cross-listed firms than for domestic firms for several reasons. First, the quality and quantity of public information is lower for cross-listed firms compared to that of U.S. domestic firms (Leuz et al. 2003; Bradshaw et al. 2004; DeFond et al., 2006). Leuz et al. (2003) find more pervasive earnings management in countries with weak investor protection. DeFond et al. (2006) also show that earnings are less informative in countries with poor accounting quality and weak insider trading law enforcements. Second, although cross-listed bonds are subject to SEC's jurisdiction, their public reports are still influenced by home regulatory environment and managerial discretion. Consistent with the premise that SEC's oversight does not entirely overcome the effect of local market, Lang et al. (2006) find that cross-listed reconciled earnings are subject to greater earnings management than U.S. earnings. Third, the private information collection of rating agencies is unlikely to fully offset the higher information asymmetry of cross-listed bond issuers. Overall, since cross-listed bonds are likely to have higher information

asymmetry, which amplifies rating agency's asymmetric loss function, we hypothesize that cross-listed bonds are rated more conservatively than U.S. domestic bonds.[2]

Using a sample of public debt issued in the U.S. by foreign firms between 1990 and 2009, we find that, on average, cross-listed bonds have significantly lower ratings at issuance compared to U.S. bonds with similar issuer and issue characteristics. Specifically, in a regression of bond ratings on a cross-listed bond indicator variable and various issue, issuer, country-level control variables, the coefficient on the cross-listed bond indicator variable is 0.78 and statistically significant at less than 1% level. Thus, cross-listed bond ratings are almost one notch lower than comparable U.S. domestic bond ratings. Our results are consistent with the hypothesis that cross-listed bonds are rated more conservatively than domestic bonds.

It is possible that the initial conservative rating for cross-listed bonds is only temporary and that the bias reverses as more information becomes available once foreign registrants meet the SEC filing requirements. Therefore, we investigate the likelihood, frequency, and timing of subsequent rating changes. We find that following the initial rating assignment, cross-listed bonds are less likely to be upgraded, are likely to receive fewer upgrades, and take longer to be upgraded. These results suggest that the initial conservative ratings of cross-listed bonds are permanent and that they do not reverse over the subsequent periods.

A key argument in our paper is that ratings are more conservative when the cost to their reputation is also high. While rating agencies have higher reputation cost from underestimating than overestimating default risk (Beaver et al. 2006), the reputation cost of underestimating the default risk is substantially higher for investment-grade bonds than for speculative-grade. Thus, we expect that the investment-grade cross-listed bonds are rated more conservatively compared

[2]It is also possible that the private information collection of rating agencies may mitigate information asymmetry, which works against finding our hypothesized relation. We discuss this possible alternative in detail in Section 2.

to non-investment-grade cross-listed bonds. Consistent with our expectation, we find that rating conservatism for cross-listed bonds is confined to investment-grade bonds.

While our results are consistent with ratings conservatism, they are also consistent with an alternative explanation that rating agencies possess private information about the default risk of cross-listed bonds and that lower ratings accurately reflect the additional risk of cross-listed bonds (Ederington et al. 1987; Reiter and Zeibart 1991). We call this the "private information" explanation.[3] We conduct two additional tests to further differentiate between the rating conservatism and private information explanations.

Our first test directly compares the probability of ratings failing to predict a default, and the probability of ratings raising a false alarm about a future default across cross-listed bonds and U.S. domestic bonds. If the lower rating is due to rating conservatism, cross-listed bond ratings are expected to have a higher probability of raising false alarms (Type I error) and a lower probability of failing to predict future defaults (Type II error). In contrast, if the lower rating of cross-listed bonds accurately reflects higher default risk, we do not expect the probability of raising false alarms and failing to predict future defaults to vary between cross-listed and U.S. domestic bonds. Our results indicate that ratings of cross-listed bonds are more likely to raise false alarms and are less likely to fail to predict a future default than ratings of domestic bonds, providing direct support for the conservatism explanation.

Our second test compares the spreads to a benchmark (defined as the yield to maturity less a U.S. treasury yield with similar maturity) on the issuance day between cross-listed bonds

[3] In a 2002 Moody's global credit research report entitled "Understanding Moody's Corporate Bond Ratings and Rating Process", Moody's clearly points out that it uses confidential non-public information that issuers provide to Moody's only for the purpose of assigning ratings (p.5).

and U.S domestic bonds.[4] If the bond market perceives ratings of cross-listed bonds as being conservative, we expect a correction for the conservative bias, i.e., a lower spread for foreign bonds compared to domestic bonds with comparable ratings. On the other hand, if the bond market perceives that rating agencies' private information captures the additional risk of a foreign issuer, we do not expect the spread to vary between cross-listed bonds and domestic bonds with comparable ratings. We find that the spread for cross-listed bonds is on average 28 basis points lower for cross-listed bonds than for U.S. domestic bonds after controlling for ratings and various issue, issuer, and country characteristics. We also find that the price correction is concentrated in investment-grade bonds, which is consistent with rating conservatism being confined to investment-grade bonds. Collectively, our second test also suggests that the lower ratings associated with cross-listed bonds is consistent with the rating conservatism explanation instead of the private information explanation. We note, however, while these analyses are in favor of the conservatism explanation, we cannot completely rule out the alternative explanation that the cross-listed bonds are riskier than U.S. domestic bonds.

Our study makes several contributions. First, our study advances the rating literature by proposing information asymmetry as another explanation for rating conservatism. Using the differences in the information environment between cross-listed and domestic U.S. bonds, we provide evidence that ratings are more conservative when information asymmetry is high.[5] Second, our findings also add to the small yet growing literature on the application of conservatism principle outside financial reporting (Lu and Sapra 2009; Hugon and Muslu 2010).

[4] The underlying assumption of this test is that bond market is efficient, which is a reasonable assumption based on prior literature (Hotchkiss and Ronen 2002; Covitz and Harrison 2003).

[5] We extend Beaver et al. (2006) in two additional aspects. Beaver et al. (2006) focus on the timeliness of rating downgrades, and we study both initial rating assignments and subsequent rating revisions. Also, by differentiating between the conservatism and private information explanations, we rule out one potential alternative explanation for rating conservatism that could also be applicable for the findings in Beaver et al. (2006).

While existing rating studies largely focus on rating attributes such as timeliness and accuracy (Cheng and Neamtiu 2009), our paper extends the literature by emphasizing a less frequently examined yet intuitive rating property. Third, our paper adds to the very limited research on foreign firms issuing debt in the U.S. by documenting the rating properties of cross-listed bonds and their pricing implications.[6] Finally, our findings also add to the ongoing debate on the role of reputational concerns in ratings quality. He, Qian, and Strahan (2011) conclude that the balance of forces in the MBS market that lead to inflated rating for large issuers is a unique phenomenon. By providing evidence of rating conservatism for cross-listed bonds, our results echo their view that the upward rating bias in the subprime mortgage market does not extend to the corporate bond market.

The remainder of the paper is organized as follows. Section 2 motivates the paper and develops the hypotheses. Section 3 describes the data and research design and presents the empirical results. Section 4 presents additional analyses and robustness tests. Section 5 concludes the paper.

2. Motivation and Hypothesis Development

Motivation

Rating agencies claim that their long-term reputational concerns minimize any incentives

[6] Additionally, examining cross-listed bonds is important in itself because relatively little is known about the properties of cross-listed bonds, while the evidence regarding cross-listed equity is extensive (Karolyi 2006). Understanding the rating properties of foreign bonds is especially important because foreign firms raise significantly more debt than equity in the U.S. For example, Chaplinsky and Ramchand (2004) report that while foreign firms are allowed to issue either debt or equity, the total amount of capital raised by debt is nearly eight times the amount raised by equity.

to inflate rating for immediate gains.[7] The U.S. Securities and Exchange Commission (SEC) also reiterates that a rating organization's business is wholly dependent on continued investor confidence in the credibility and reliability of its ratings and that no single fee or group of fees can be important enough to the organization to jeopardize its future business (SEC 2003). Several academic studies provide evidence consistent with the perspective that reputational concerns motivate credit rating agencies to improve the quality of credit ratings. Cheng and Neamtiu (2009) conclude that increased regulatory intervention and reputation concerns have improved rating timeliness and accuracy over time. Moreover, consistent with ratings becoming more conservative after Enron and the Sarbanes Oxley Act., Alp (2011) finds that ratings drop 1.5 notches due to tightened standards between 2002 to 2007.

However, the reputation of credit rating agencies is still tarnished by rating-related scandals. For example, rating agencies failed to foresee the bankruptcies of Enron and WorldCom in 2002. They have also been heavily criticized for inflating ratings of mortgage-backed securities and collateralized debt obligations (hereafter, MBS and CDO) in the recent financial crisis. Economist Joseph Stiglitz states "I view the rating agencies as one of the key culprits ...They were the party that performed the alchemy that converted the securities from F-rated to A-rated."

Given the recent controversy surrounding the quality of credit ratings, it becomes vital to understand how the complex incentive structure of rating agencies might affect the properties of credit ratings. We contend that rating agency's asymmetric payoff function provides them with strong incentives to issue conservative ratings when they are not well-informed about the issuer, i.e., when information asymmetry is high. Studying the properties of ratings might indicate

[7] For example, Moody's claims, ''we are in the integrity business'' (House, 1995, p. 245). However, critics argue that the issuer-pay model creates significant conflicts of interest and may contribute to inflated ratings that under-estimate the true default risk (Bolton, Freixas and Shapiro 2012, Skreta and Veldkamp, 2009).

whether reputational concerns motivate rating agencies to issue more conservative ratings particularly when they have less information about the issuer.

Rating conservatism and information asymmetry

Beaver et al. (2006) provide an important initial step towards understanding rating conservatism. They argue that certified credit rating agencies are conservative, i.e., they impose a higher standard when reporting favorable ratings than when reporting unfavorable ratings, because the use of certified ratings in debt contracts makes rating agencies' loss function asymmetric. In this paper, we explore high information asymmetry as an alternative source of rating conservatism. Because reputation costs are high when an issuer defaults but ratings indicate otherwise than when an issuer has a higher credit quality relative to its ratings (Beaver et al., 2006), the maintained assumption in our paper is that rating agencies have an asymmetric loss function.

We argue that high information asymmetry exacerbates rating agencies' asymmetric loss function for the following reason. When information asymmetry is high, it is more difficult for the rating agencies to evaluate the issuers' intrinsic value and credit-worthiness. Morgan (2002) suggests that rating agencies disagree more often over ratings of banks and insurance firms because financial intermediaries have more opaque assets. Similarly, Livingston et al. (2007) conclude that asset opaqueness is associated with more split rating for industrial firms. Therefore, holding the information-collection effort constant, rating agencies are more likely to overestimate, or underestimate, the creditworthiness of issuers when information is more opaque. Because failing to predict a default is particular damaging to their reputation, rating agencies are more likely to impose a higher standard when reporting favorable ratings than when reporting

unfavorable ratings for bonds with high information asymmetry. Hence, we expect bonds to be rated more conservatively when rating agencies encounter high information asymmetry.

While prior studies use various proxies to measure information asymmetry in equity markets (Bessembinder et al. 2007; Edwards et al. 2007), measuring information asymmetry in debt markets is less straightforward because conventional proxies used for equity markets including the probability of informed trading (PIN) are not applicable for debt markets. One innovation in our study is that we test our hypothesis by identifying a group of bonds that are likely to have higher information asymmetry than another group, i.e., cross-listed bonds vs. U.S. domestic bonds.[8]

Cross-listed bonds differ from domestic bonds on several key dimensions that increase information asymmetry. For instance, U.S. investors typically have limited public information about foreign firms relative to U.S domestic firms. Although foreign firms issuing public debt are required to register with the SEC, and file a form 20-F that includes reconciliations to U.S. GAAP, the reconciliations provide limited information for U.S. investors relative to the amount of information available for U.S. firms (Bradshaw et al. 2004). Further, while the 20-Fs reconcile differences in financial statements produced under IFRS/home-GAAP and those under U.S GAAP, there are significant differences in the information contained in the notes to the financial statements.[9] Moreover, reconciliations are less timely because they are required on an annual basis rather than on a quarterly basis. Besides limited financial reporting, information available

[8] We compare the ratings of cross-listed bonds to those of U.S. domestic bonds to find out the impact of information asymmetry on rating conservatism. While it might be interesting to compare the ratings of foreign bonds cross-listed in the U.S. with those listed in their domestic markets, such comparisons do not provide insights into ratings conservatism.

[9] The extent of the reconciliations and required disclosures varies according to whether firms complete Item 17 or 18, in Form 20-F. Item 17 is reserved for limited offerings and requires fewer disclosures than Item 18, which essentially requires the non-U.S. issuer to provide the same disclosures as a U.S. issuer.

on debt contracts is also limited in many foreign countries. For example, in Germany and Japan, the details of the debt contracts such as debt covenants are not subject to mandatory disclosure.

In addition to limited quantity of information, the quality of information for foreign issuers might also be lower. Leuz et al. (2003) find that earnings management is more pervasive in countries where the legal protection of outside investors is weak. DeFond et al. (2006) show that earnings are less informative in countries with poor accounting quality and weak insider trading law enforcement. Although cross-listing may improve a foreign firm's information environment, Fernandes and Ferreira (2008) show that cross-listing in the U.S. improves the information environment for firms that originate from developed markets but not those from emerging markets. Moreover, while cross-listed bonds are subject to monitoring by the SEC, the public reports are influenced by the regulatory environment and managerial incentives in their home countries. Consistent with the argument that SEC's oversight does not entirely overcome the effect of local market, Lang et al. (2006) find that reconciled earnings of cross-listed firms are subject to more earnings management (smoothing, target management, lower association with share price, less timely recognition of losses) than earnings of U.S. firms.

It is possible that rating agencies may decide to invest in private information acquisition to offset some of the information asymmetry associated with cross-listed bonds so that ratings accurately reflect the default risk of the issuer. Any additional investment associated with acquiring private information is expected to be incorporated in rating fees. However, it is unclear whether foreign issuers would be willing to bear the additional cost of the private information acquisition. Hence, it is likely that rating agencies might have to bear some of the cost burden of collecting private information about the foreign issuer. [10] Even when the foreign issuer is willing

[10] One can possibly infer from rating fees rating agency's investment in reducing information asymmetry. However, there is little information about rating fees other than the following. First, fees are largely determined by the issue

to share the cost of private information acquisition, rating agencies' private information is unlikely to fully offset the information asymmetry. This is because U.S. ratings agencies may not have a local office in the home country of the foreign issuer which obstructs the collection of accurate private information. Also, if the issuer is located in a foreign country where a rating agency does not have relevant company/governmental contacts or a deep understanding of the home country's institutional factors, any private information generated may not be as accurate as those generated for comparable U.S. domestic issuers. Therefore, at the margin, if information production costs are high for foreign issuers, and the returns from the additional investment are low, a rational economic response for rating agencies is to issue more conservative ratings for cross-listed bonds.

Therefore, our first hypothesis states

H1: *Cross-listed bonds are rated more conservatively than U.S. domestic bonds.*

Differentiating between the rating conservatism and private information explanations

When rating agencies have limited public information, as might be the case with cross-listed bonds, they are likely to acquire more private information to offset their information disadvantage. Therefore, a conservative rating bias for cross-listed bonds, relative to comparable U.S. domestic bonds, is also consistent with rating agencies having access to private information which suggests higher default risk for cross-listed bonds (the private information explanation). Since the private information of the rating agencies cannot be captured by observable issuer-, issue-, and country-characteristics, controlling for these characteristics would not eliminate this

size. For example, Moody's standard fee per issue is 0.033 percent for the first $500 million of par value and 0.02 percent of additional par value (Covitz and Harrison, 2003). Second, fees differ across the security types. For example, S&P charges 7.75 basis points more to rating a CDO than a corporate bond (Tomlinson and Evans, 2007). It is unclear whether rating agencies charge a premium to rate cross-listed bonds. If they do, it works against finding a downward rating bias for cross-listed bonds since rating agencies are compensated for their risk and effort.

alternative explanation. We conduct two additional tests to differentiate between the rating conservatism and private information explanation.[11]

The probability of missing defaults and raising false alarms

We provide direct evidence on rating conservatism by analyzing whether ratings are accurate in predicting future default. Accordingly, we directly test: (1) the probability that ratings fail to predict near-term default, and (2) the probability of ratings raising a false alarm about the probability of a near-term default. If the lower cross-listed bond rating reflects rating conservatism, we expect ratings of the cross-listed bonds to be associated with more frequent false alarms and a lower probability of missing near-term defaults. In contrast, if lower ratings capture higher intrinsic default risk of cross-listed bonds, we do not expect the probabilities of false alarms and missing defaults to vary systematically between cross-listed and U.S. domestic bonds, since the initial ratings are unbiased. This leads to our second hypothesis.

H2: *Rating agencies are more likely to raise false alarms and are less likely to fail to predict near-term defaults of cross-listed bonds than domestic bond ratings.*

The bond market correction

We also use the bond market to differentiate between the rating conservatism and private information explanations. Prior literature has established that the bond markets are informationally efficient.[12] An efficient bond market is expected to be unbiased and correct for any potential rating bias. Therefore, if bond markets perceive cross-listed bonds to be rated conservatively, the cost of debt for cross-listed bonds is expected to be lower than that of U.S.

[11] The rating conservatism and the private information explanations may not be mutually exclusive. It is possible that a rating bias is an outcome of both explanations. Our tests are designed to tease out the dominating explanation.

[12] For instance, Livingston, Wei, and Zhou (2010) find that bond investors assign a larger weight on ratings when rating agencies are more conservative. Similarly, Hotchkiss and Ronen (2002) conclude that the informational efficiency of corporate bonds is similar to that of the underlying stocks. In a related study, Covitz and Harrison (2003) find that bond market preempts 75% of the information contained in downgrades.

domestic bonds with the same ratings because the inherent credit quality of cross-listed bonds is superior to that of U.S. bonds with comparable ratings. In contrast, if the bond market perceives ratings as containing private information about the default risk of foreign issuers, the additional default risk is priced by the bond market. In this case, the cost of debt would be the same for cross-listed and domestic bonds for the same ratings category. Therefore, we expect a price correction under the rating conservatism explanation, but not under the private information explanation.[13] This leads to our final hypothesis.

> ***H3:*** *The bond market corrects for the downward rating bias in cross-listed bonds by demanding a lower cost of debt.*

3. Data, Research Design, and Empirical Results

Data description

We obtain data on U.S. bond issuance by U.S. domestic firms and foreign cross-listed firms from the *Mergent Fixed Investment Securities* Database (FISD). We include non-governmental firms (both U.S. and non-U.S.) issuing fixed-rate public debt between 1990 and 2009. We also include Rule 144A private placements, which allow for the private resale of unregistered securities to "qualified institutional buyers" who are generally large institutional investors with assets exceeding $100 million.[14] For U.S. (non-U.S.) issuers, we obtain issuer characteristics from *Compustat* (*Datastream*). The final sample consists of 1,799 public debt issues by non-U.S. firms (treatment sample) and 6,937 public debt issues by U.S. firms (control sample).

[13] The bond market's correction for any conservative rating bias is not necessarily inconsistent with our maintained assumption that investors rely on ratings for investment decisions. The two main types of bond market participants are: (1) individual investors, who are more likely to rely exclusively on bond ratings for investment decisions, and (2) institutional investors, who are more sophisticated investors relying on ratings while using private information for investment decisions. We expect bond market prices to be set by institutional investors because any mispricing arising as a result of trading by individual investors would be arbitraged away by institutional investors. Therefore, in equilibrium, the rating bias would be priced appropriately in an informationally efficient bond market.

[14] We delete observations when the spread to benchmark or the offer yield to maturity is missing.

Table 1 presents the frequency distribution of cross-listed bonds for each year from 1990 to 2009. The number of public debt issues by non-U.S. firms increased from 4 in 1990 to 299 in 2001. However, the last eight years (2002 to 2009) exhibit a significant decline in the number of debt issues. The number of cross-listed public debt issues in 2009 was down to 38. Debt issues peaked in 2001 largely in response to the aggressive interest rate reduction by the FED to confront the recession in the U.S.[15] The gradual decline in debt issuance after 2002 is consistent with the conjecture that the stringent regulatory environment imposed by Sarbanes-Oxley Act (SOX 2002) discouraged foreign firms from raising capital in the U.S. (Gao 2011). The number of foreign countries raising debt in the U.S. also increased from 3 to 28 from 1990 to 2001, but declined over the subsequent years. Over the entire sample period, non-U.S. firms raised a total of $1.10 trillion in public debt in the U.S with an average issuance size of $612 million.

Table 2 presents the frequency distribution of the number of debt issues, magnitude of the aggregate public debt (in million dollars), and the average issue size (in million dollars) by the country of origin. Our sample includes firms from 37 distinct countries raising public debt in the U.S. Canadian firms raised debt most frequently in the U.S., followed by firms from United Kingdom, Netherlands, and France. The total amount of debt issued in the U.S. was the largest for Dutch firms, followed by issuers from United Kingdom, Canada, and France.

Table 3 reports the mean and median comparisons between cross-listed bonds and U.S. domestic bonds. Since the inferences based on means and medians are similar, we focus our discussion on the results obtained from comparisons of the mean values. We find that the issue size of the debt offerings is significantly larger for non-U.S. firms. Cross-listed bonds tend to have shorter maturities and are more likely to be senior debt, but less likely to include callable

[15] Because of the interest rate cut, foreign firms were able to issue bonds at higher prices in the U.S., making the issuance more attractive in the U.S. than in alternative markets such as Eurodollar and Rule 144A bond markets.

feature. We also find that cross-listed bonds have superior ratings than domestic bonds, which is inconsistent with the first hypothesis stating that cross-listed bonds in the U.S. are rated more conservatively. However, we also find that non-U.S. issuers are generally larger, less levered, more profitable, and raising more money. Therefore, it is not surprising that non-U.S. bonds have better ratings than U.S. bonds in the univariate (unconditional) analysis. Our hypothesis is that, given the same credit quality, non-U.S. bonds are assigned lower ratings than U.S. bonds. Hence, multivariate analysis is better suited to test our hypothesis which controls for other issuer, issue, and country-specific characteristics.

Rating conservatism as reflected in the initial rating

To test whether rating agencies are more conservative when rating cross-listed bonds, we estimate the following ordered probit regression, with ratings at issuance as the dependent variable.[16]

$$\begin{aligned} Rating = \alpha + \beta_1 Non\text{-}US + \beta_2 Issue\ size + \beta_3 Maturity + \beta_4\ Seniority + \beta_5 Callability + \beta_6 Puttability + \\ \beta_7 Default\ spread + \beta_8 Firm\ size + \beta_9 Leverage + \beta_{10} Profitability + \beta_{11} Interest\ coverage + \\ \beta_{12} Capital\ expenditures + \beta_{13} Emerging + \beta_{14} Civil\ law + \beta_{15} Rule\ of\ law + \beta_{16} Creditor\ rights + \\ \beta_{17} Judicial\ efficiency + \beta_{18} Ex\text{-}ante\ self\text{-}dealing + \beta_{19} Ex\text{-}post\ self\text{-}dealing + \beta_{20} Anti\text{-}director \\ rights + \beta_{21} Public\ enforcement + \beta_{22} Disclosure\ requirements + \beta_{23} Liability\ standards + \\ \beta_{24} Investor\ protection + Year\ dummies + Industry\ dummies + \varepsilon \end{aligned} \quad (1)$$

where*:*

Rating	=	one for firms with the best credit rating (AAA) and the value increase by one for successively worse rating categories.[17]
Non-US	=	one when debt is issued by a non-U.S. firm and zero otherwise.
Issue size	=	the natural logarithm of the size of the debt issue in million dollars.
Maturity	=	the natural logarithm of the number of years to maturity.
Seniority	=	one when the debt is senior and zero otherwise.
Callability	=	one when the bond includes a call provision and zero otherwise.
Puttability	=	one if the bond includes a put provision and zero otherwise.
Default spread	=	the yield difference between AAA- and BAA-rated corporate bonds.

[16] Following the Cheng and Neamtiu (2009) procedure for coding rating categories into numeric ratings, we assign a score of 1 for the best rating category. Higher numeric ratings represent worse ratings. The complete mapping of letter ratings to numeric ratings is listed in Appendix A.

[17] We define the initial rating as the first rating assigned to an issue during the first month after the offering date by Standard and Poor's, Moody's or Fitch. If a bond is rated by multiple agencies, we assign the highest of the ratings to the issue. Results do not change when we use the lowest rating or we use the average of all assigned ratings in the regressions. Results also do not change when we focus on the initial ratings assigned by a single rating agency.

Firm size	=	total assets of the issuer at the end of the fiscal year prior to bond issuance.
Leverage	=	total debt divided by total assets at the end of the fiscal year prior to bond issuance.
Profitability	=	EBITDA divided by total assets in the fiscal year prior to bond issuance.
Interest coverage	=	EBIT divided by interest expense in the fiscal year prior to bond issuance.
Capital expenditure	=	Capital expenditure for the fiscal year prior to bond issuance divided by total assets.
Emerging	=	one if the issuing country is defined as being part of an emerging market defined by Morgan Stanley Capital International.
Civil law	=	one if the legal origin of the issuing country is civil law.
Rule of law	=	an index between -1.06 and 2.22 that assesses the extent to which investors have confidence in and abide by the rules of the society, as defined in La Porta et al. (2006).
Creditor rights	=	an index between 0 and 4 that aggregates different creditor rights in case of bankruptcy and reorganization, as defined in La Porta et al. (1998).
Judicial efficiency	=	an index between 0 and 10 that assesses the efficiency and integrity of the legal environment as it affects business and reflects the investors' assessment of conditions in the country in question, as defined in La Porta et al. (1998).
Ex-ante self-dealing & *Ex-post self-dealing*	=	indices that range between 0 and 1 and measure the approval requirements for managerial actions and the ease of proving wrongdoing against managers, respectively, as defined in Djankov et al. (2008).
Anti-directors rights	=	an index between 0 and 6 that aggregates different investor rights against directors, as defined in Spamann (2010).
Public enforcement	=	an index between 0 and 1 that aggregates various criminal sanctions against various parties, as defined in La Porta et al. (2006).
Disclosure requirements	=	an index between 0 and 1 that assesses the strength of specific disclosure requirements, as defined in La Porta et al. (2006).
Liability standards	=	an index between 0 and 1 that assesses the procedural difficulty in bringing lawsuits against managers, distributors and accountants, as defined in La Porta et al. (2006).
Investor protection	=	a comprehensive index between 0 and 1 that aggregates various legal dimensions such as liability standards, investor rights and risk of expropriation, as defined in La Porta et al. (2006).

Higher values of all the country-level indices indicate stronger investor protection. Our variable of interest is *Non-US*. A positive coefficient indicates that ratings of cross-listed bonds are more conservative than those of U.S. domestic bonds.

We include additional explanatory variables that are determinants of corporate bond ratings (e.g., Kaplan and Urwitz 1979; Reiter and Ziebart 1991). These control variables fall into three categories: issue characteristics, issuer characteristics, and country-specific variables. Prior studies find that issue characteristics are key determinants of bond ratings. Typically, issues that are larger, have shorter maturities, and are not callable have superior credit ratings (Bhojray and Sengupta 2003). Puttable bonds offer the option of forcing the company to repurchase the bonds before maturity. We also control for economic conditions at the time of the issue by including the default spread as an additional explanatory variable.

We include issuer firm characteristics because these variables capture the underlying determinants of credit risk. We expect larger, less levered and more profitable firms to have superior ratings. We also include the interest coverage ratio which is a key determinant of the liquidity. As in Miller and Reisel (2011), we also control for capital expenditures as proxy for investment opportunities.

Finally, we also include country characteristics because these factors determine default risk that affects ratings of foreign issuers (Covrig et al. 2007; Francis et al. 2007). Rajan and Zingales (1995) find large variations in the approaches taken by bankruptcy courts from different countries and that institutional differences play a role in determining ratings. Ferri et al. (2001) find a strong linkage between sovereign ratings and firms' private ratings for developing countries. Purda (2003) finds that, in addition to the influence of firm-specific variables on debt ratings, various country-specific factors predict debt ratings. Perraudin and Taylor (2004) also find that firms domiciled in Japan, Europe and the U.S. pay different yields for particular ratings categories. To control for the impact of country-specific factors on bond ratings, we include indicator variables for the country of origin (emerging economy) and its legal tradition (civil law). We also control for differences in legal environment as in La Porta et al. (1998, 2006), Djankov et al. (2008), and Spamann (2010).

The first regression in Table 4, which reports the results based on the full sample, examines whether initial ratings are worse for cross-listed bonds after controlling for other factors that affect credit ratings.[18] We find that the coefficient on *Non-US* is positive (β=0.78)

[18]The t-statistics, and the corresponding p-values, for all the regressions results are based on standard errors clustered by firm. We use firm-cluster because greater proportion of U.S. bonds could lead to inflated t-statistics. Wooldridge (2003) notes that the clustered standard errors approach is not appropriate when the number of clusters is small relative to the number of observations in each cluster. Thus we use the more conservative approach by clustering at firm level. However, we also conduct sensitivity tests using standard errors clustered by country and find similar results.

and significant at less than 1% level. Since higher values of the dependent variable correspond to worse ratings, the result indicates that ratings for non-U.S. firms issuing public debt in the U.S. are about one notch worse than those of similar U.S. firms. Thus, consistent with H1, our results suggest that, controlling for other factors, rating agencies are more conservative when assigning initial ratings to cross-listed bonds than to domestic bonds.

A key maintained assumption underlying rating conservatism for cross-listed bonds is that information asymmetry is higher for cross-listed bonds than U.S. bonds. One implication of our assumption is that the rating conservatism should vary with the degree of information asymmetry across countries. Because ratings agencies are likely to encounter lower information asymmetry when rating bonds from countries with stronger legal institutions protecting creditor rights, rating conservatism is expected to be less pronounced when foreign issuers originate from countries with stronger creditor protection rights. Accordingly, we test whether initial ratings of cross-listed bonds are related to country specific institutions characteristics for a sample of non-U.S. bonds.

The results from the second regression in Table 4 are consistent with our expectation that ratings are significantly better for issuers from countries with stronger law enforcements and creditor rights. We find significantly negative coefficients on *Rule of law*, *Ex-ante self-dealing*, *Anti-director rights*, *Public enforcement*, *Disclosure requirements*, and *Liability standards*. This suggests that rating conservatism is less pronounced for issuers from countries with stronger rule of law, tougher laws limiting director entrenchment, stronger enforcement of regulation, superior disclosure requirements, and higher liability standards.

Rating conservatism as reflected in subsequent rating changes

We also examine whether rating conservatism is confined to initial ratings or whether the conservatism in ratings persists in subsequent rating changes. Therefore, we also investigate changes and the timing of upgrade and downgrade decisions subsequent to the bond issuance.[19] In particular, we replace the dependent variable in Model (1) with: a) an indicator variable for subsequent upgrades or downgrades; b) the number of upgrades or downgrades divided by the total number of assigned ratings; c) the number of days between the initial rating and the first upgrade or downgrade. Importantly, we control for initial rating to control for the differential downgrade/upgrade pattern for various rating categories. If initial conservative ratings are not a temporary phenomenon, we expect cross-listed bonds to: a) be less likely to receive an upgrade and more likely to receive a downgrade, b) to receive less frequent upgrades and more frequent downgrades, and c) take longer to receive an upgrades and shorter to receive a downgrade.

We report the results of these additional tests in Table 5. In the first two models, we estimate a Probit regression where the dependent variable is an indicator variable for subsequent rating changes (*Upgrade* or *Downgrade*). We find that the coefficient on *Non-US* is significantly negative when the dependent variable is *Upgrade*, which indicates that foreign bonds are less likely to receive a rating upgrade within three years of the offering date. The coefficient on *Non-US* is positive but statistically insignificant, suggesting that foreign bonds are as likely to receive a rating downgrade as U.S. domestic bonds.

In the next set of results, we report the OLS regression results where the dependent variable is the relative frequency of subsequent rating changes (upgrades or downgrades). We find a significantly negative coefficient on *Non-US* when the dependent variable represents the frequency of subsequent upgrades, indicating that subsequent to initial ratings, cross-listed bonds

[19] We restrict this analysis to S&P ratings only so that both the initial rating and subsequent rating changes are consistently from the same rating agency. We perform a sensitivity analysis that uses Moody's rating and find similar results.

receive significantly fewer upgrades. Again, once we account for other factors, we find no significant difference in the frequency of subsequent rating downgrades for cross-listed bonds compared to U.S. domestic bonds. Finally, Table 5 reports the OLS regression results where the dependent variable measures the time interval before the first upgrade or downgrade. We find a significantly positive coefficient on *Non-US* when the dependent variable is the time interval before the first upgrade, suggesting that it takes a longer time for a cross-listed bond to receive an upgrade. However, we find no significant difference in the time interval before the first downgrade for cross-listed bonds.[20]

Collectively, the results from Table 5 suggest that the initial conservative rating bias in cross-listed bonds documented in Table 4 persists subsequent to the bond issuance.

Cross-sectional variation in the conservative ratings of cross-listed bonds

In Table 6, we explore whether the rating conservatism depends on the credit quality of the bond by estimating Model (1) separately for investment- and speculative-grade cross-listed bonds. We find that while the coefficient on *Non-US* is positive and significant (β=1.17) for investment-grade bonds, the corresponding coefficient is insignificant for speculative-grade bonds. Therefore, the Table 6 results suggest that the average lower ratings for foreign bonds documented in Table 4 are confined to investment-grade bonds. Because rating agencies have higher reputation costs from failing to predict the default of an investment-grade bond, they are more likely to be cautious when attaching an investment-grade rating to a foreign issuer. Thus, the results from Table 6 are consistent with the notion that reputation costs to ratings agencies are substantially higher for investment-grade bonds.

Differentiating between the rating conservatism and private information explanation

[20] Since we examine rating changes within three years of an issuance, bonds with less than three years of maturity are less likely to get upgraded or downgraded than those with longer maturity. As a robustness check, when we limit the sample to include bond issues with at least three years of maturity, we find qualitatively similar results.

A relatively lower rating for cross-listed bonds is consistent with both the rating conservatism explanation and the private information explanation. Under the private information explanation, rating differences between comparable cross-listed and U.S. bonds capture rating agencies' private assessment of the intrinsic default risk of cross-listed bonds. We distinguish between the two competing explanations using the following two tests.

The probability of missing defaults and raising false alarms

As in Cheng and Neamtiu (2009), we define two indicator variables, one for missed defaults and another for false alarms. For a sample of issuers with a default, *Missed default* equals one if an issue defaults within one year from the rating date but the rating indicates a low default risk (investment-grade), and zero otherwise. *False alarm* equals one if an issuer does not default within one year from the rating date but the rating indicates a high default risk (non-investment-grade), and zero otherwise.

Table 7 presents the results from directly comparing the probabilities of missing defaults and raising false alarms for cross-listed and U.S. domestic bonds. Consistent with H2, the coefficient on *Non-US* is significantly negative in the first regression where *Missed default* is the dependent variable. The results suggest that rating agencies are less likely to miss predicting the default of cross-listed bonds that are investment-grade relative to similar U.S. domestic bonds.[21] In the second regression where we use *False alarm* as the dependent variable, the coefficient on *Non-US* is significantly positive, which indicates that rating agencies are more likely to provide false warnings about the default risk of non-investment-grade, cross-listed bonds compared to similar U.S. domestic bonds.

[21] We further analyze the 510 cases where ratings failed to predict a future default for cross-listed and domestic bonds for a given rating. Overall, 95 out of 448 U.S. bond ratings (21%) are classified as missed defaults, while only 3 out of 62 cross-listed bond ratings (5%) are classified as missed defaults. The univariate results confirm that rating agencies are less likely to miss predicting a future default of a cross-listed bond relative to a comparable U.S. bond.

The results from Table 7 indicate that rating agencies are willing to bear a higher cost from raising false alarms to reduce the cost of missing a default, thereby providing direct evidence consistent with our assertion that rating agencies are more conservative in rating cross-listed bonds to reduce the cost associated with missing defaults.

The bond market correction

We rely on the cost of debt on the issuance date as a second test to differentiate between the conservative rating bias and private information explanation. We use *Spread to benchmark*, defined as the yield to maturity on the offer date (*Offer yield*) minus the yield of a U.S. Treasury security issued on the same date with comparable maturity, as a proxy for the cost of debt.[22] We test for differences in the cost of debt between non-U.S. and U.S. firms using the following regression:

$$\begin{aligned} \textit{Cost of debt} = {} & \alpha + \beta_1 \textit{Non-US} + \beta_2 \textit{Issue size} + \beta_3 \textit{Maturity} + \beta_4 \textit{Seniority} + \beta_5 \textit{Callability} + \beta_6 \textit{Puttability} + \\ & \beta_7 \textit{Default spread} + \beta_8 \textit{Firm size} + \beta_9 \textit{Leverage} + \beta_{10} \textit{Profitability} + \beta_{11} \textit{Interest coverage} + \\ & \beta_{12} \textit{Capital expenditures} + \beta_{13} \textit{Emerging} + \beta_{14} \textit{Civil law} + \beta_{15} \textit{Rule of law} + \beta_{16} \textit{Creditor rights} + \\ & \beta_{17} \textit{Judicial efficiency} + \beta_{18} \textit{Ex-ante self-dealing} + \beta_{19} \textit{Ex-post self-dealing} + \beta_{20} \textit{Anti-director rights} + \\ & \beta_{21} \textit{Public enforcement} + \beta_{22} \textit{Disclosure requirements} + \beta_{23} \textit{Liability standards} + \\ & \beta_{24} \textit{Investor protection} + \textit{Year dummies} + \textit{Industry dummies} + \textit{Rating dummies} + \varepsilon \quad (2) \end{aligned}$$

Our interest is on β_1, the coefficient of *Non-US*, which captures the bond market's "correction" for a possible rating bias. A negative β_1 indicates that, compared to U.S. firms with similar ratings and issue characteristics, non-U.S. firms have a lower cost, consistent with the bond market perceiving the rating bias as an outcome of rating conservatism. In contrast, an insignificant β_1 indicates that, compared to U.S. firms with similar ratings and issue characteristics, non-U.S. firms have similar cost of debt, which is consistent with the private information hypothesis.

Because the control variables in the cost of debt regressions have been commonly used in prior literature (e.g., Kidwell et al. 1984; Miller and Puthenpurackal 2002), we provide a limited

[22] Our results are qualitatively similar if we winsorize *Spread to benchmark* at the 1st and 99th percentiles.

discussion of these variables. To control for the nonlinearity, we include rating dummies instead of ordinal ratings as controls. Larger issues (*Issue size*) have lower cost of debt because these issues tend to generate more public information. Bonds with longer maturity (*Maturity*) are expected to have higher cost of debt because of greater interest rate risk. Bonds with *Callability* (*Puttability*) feature give the issuer (bondholder) the option to force the bondholder (issuer) into prepayment (repurchase) before the maturity date, which results in higher (lower) cost of debt. Senior bonds (*Seniority*) are less risky than subordinated bonds. We include the *Default spread* to control for the economic conditions at the time of the issue. In addition, we expect larger, less levered and more profitable firms, and firms with high interest coverage to have lower cost of debt. We again control for capital expenditures to proxy for investment opportunities. Finally, as in the rating regressions, we control for a large set of country-specific factors.

Table 8 reports the OLS regression results of the differences in the cost of debt between cross-listed and U.S. bonds after controlling for other factors that affect the cost of debt. The dependent variable is *Spread to benchmark*.[23] When we use the full sample, the coefficient on *Non-US* is significantly negative, which is consistent with the third hypothesis (H3) that the bond market corrects for the rating bias by assigning a lower spread for cross-listed bonds with similar characteristics as the domestic bonds.[24] We also partition the sample into investment- and speculative-grade bonds and then report the results for the two sub-samples. We find that the coefficient on *Non-US* is negative and significant only for the investment-grade bonds subsample. The corresponding coefficient for the speculative-grade bonds subsample is

[23] We also estimate the OLS regressions with *Offer yield* as the dependent variable. The results are very similar to those from using *Spread to benchmark*.

[24] Prior studies find that Rule 144A issues are associated with higher yields than public bond issues (e.g., Livingston and Zhou 2002). Since foreign firms might raise debt more frequently under Rule 144A, we also re-estimate Table 8 after additionally including an indicator variable for Rule 144A issues and find consistent results.

statistically insignificant. Because the conservative rating bias is confined to investment-grade bonds (Table 6), a lower cost of debt for investment-grade, cross-listed bonds (Table 8) is consistent with the explanation that the bond market recognizes the presence of a rating bias in investment-grade cross-listed bonds and then corrects such a bias via the pricing of such bonds (Table 8). Overall, the results from the cost of debt analyses are consistent with the rating conservatism hypothesis and inconsistent with the private information explanation.

4. Additional analyses and robustness tests

Information asymmetry and rating conservatism in U.S. domestic bonds

Our maintained assumption is that information asymmetry leads to rating conservatism and that rating agencies encounter greater information asymmetry problems when bonds are cross-listed in the U.S. from foreign countries. If, as we hypothesize, information asymmetry leads to rating conservatism, we should also observe rating conservatism for U.S. domestic bonds when information asymmetry is high. Following Diether et al. (2002), we use the dispersion in analysts' quarterly earnings per share (EPS) forecasts as a proxy for the degree of information asymmetry to examine whether rating conservatism extends to U.S. domestic bonds with higher information asymmetry. We measure dispersion (*Dispersion*) as the standard deviation of quarterly earnings forecasts divided by the absolute value of the mean forecast.[25]

Table 9 reports the results from an ordered probit analysis. In the first model, we capture information asymmetry with a *High dispersion dummy*, which is coded as one if an issuer's forecast dispersion is higher than sample median, and zero otherwise. In the second model, we measure information asymmetry with the continuous value of *Dispersion*. Consistent with our

[25] Since standard deviation is scale dependent, we compute a coefficient of variation based metric whereby we divide standard deviation of earnings forecasts by the absolute value of the mean forecast.

expectation, we find that, holding other variables constant, initial ratings of U.S. domestic bonds are worse for issuers with greater dispersion in analysts' quarterly earnings forecasts. Thus, the results from Table 9 provide corroborating evidence supporting our thesis that information asymmetry is a key determinant of rating conservatism regardless of whether issuers originate from the U.S. or from foreign countries.

Greater information asymmetry for cross-listed firms

A fundamental assumption in our study is that rating agencies encounter greater information asymmetry when rating cross-listed bonds than when rating U.S. domestic bonds. We directly test whether information asymmetry is greater for cross-listed bonds using variations in analysts' earnings forecasts to measure differences in the information environment between U.S and foreign companies.

We obtain the most recent quarterly and annual EPS forecasts, immediately before the bond issuance, for our sample of U.S. and cross-listed firms from *I/B/E/S* database. As before, we define *Dispersion* as the standard deviation of earnings forecasts (quarterly or annual) divided by the absolute value of the mean forecast. This sample selection procedure results in 4,298 (4,096) U.S. companies and 408 (237) cross-listed companies with annual (quarterly) EPS forecasts. In unreported tests, the mean of *Dispersion* is 0.119 (0.139) for U.S. companies and that for cross-listed companies is 0.335 (0.412) using annual (quarterly) earnings forecasts. The difference in *Dispersion* between the two groups of firms is significantly significant.

Thus, our results from analysts' earnings forecasts provide direct evidence corroborating our assertion that cross-listed firms have greater information asymmetry than U.S. firms even after incorporating security analysts' proprietary private information.

Excluding influential countries

Because our results could be dominated by a few countries with unique institutional characteristics, we perform additional robustness tests after excluding countries with the highest number of cross-listed bonds and those with the largest average size of cross-listed bonds. The top four countries with the highest number of bonds issued in the U.S. (i.e., Canada, United Kingdom, Netherlands, and France) coincide with the top four countries with the largest average issue size. When we exclude all companies from any one of the top four countries, we find that the primary rating results continue to hold.

Upgrade and downgrade analysis

In Table 5, we focus on the three-year period following a bond issuance to identify subsequent rating upgrades and downgrades. As a robustness test, we also measure upgrades and downgrades over one- and five-year period to ensure that the results are not sensitive to the measurement window. Our unreported test results continue to provide consistent results indicating a conservative rating bias in cross-listed bonds regardless of the measurement window for rating upgrades and downgrades.

Missing default and false alarm analysis

We use investment- and speculative-grade dichotomy to define the dummy variables for *Missed default* and *False alarm* analyses in Table 7. When we use alternative cutoff points, e.g., CCC+ and CC, we continue to get consistent results.

Robust standard error clustered by country

In our main analysis we use standard errors clustered by firm because large number of observations from U.S. renders questionable statistics using country cluster. Nonetheless, we also conduct our analyses using country-cluster and all our results remain unchanged and in

many instances the results are stronger both economically and statistically. Thus, we conclude that firm-cluster is a more conservative approach.

The bond market analysis

Finally, we conduct a variety of sensitivity analyses to assess the robustness of the cost of debt results. First, because the test statistics from pooled regressions might be inflated if the residuals are cross-sectionally correlated, we also implement the Fama and MacBeth (1973) procedure where we estimate annual regressions and then compute the tests of significance based on the distribution of the annual coefficient estimates. Our results are qualitatively similar, and the conclusions remain unchanged with this estimation procedure. For instance, the annual average coefficient on *Non-US* in the *Spread to benchmark* regression is -18.07, which is highly statistically significant (t-statistic = -2.12).

Second, the results are similar when we use *Offer yield*, defined as the yield to maturity on the issuance date, as an alternative measure for the cost of debt. For the full sample, in a regression of *Offer yield* on *Non-US* and other control variables, the coefficient of *Non-US* is -0.64 (t-statistic = -3.40). Third, when we exclude bonds with special features (e.g., callable or puttable), our inferences remain unchanged. For instance, when we exclude all bonds with special features from the full sample, the coefficient of *Non-US* becomes -45.92, which is highly significant (t-statistic = -2.64).

5. Conclusion

We find that cross-listed bonds have more conservative ratings than comparable U.S. domestic bonds. In particular, cross-listed bonds are associated with lower ratings at issuance compared to similar U.S. domestic bonds. They are also less likely to be upgraded, are associated

with fewer upgrades, and take longer to receive an upgrade subsequent to the issuance. In addition, we show that the lower rating is concentrated among investment-grade cross-listed bonds, consistent with rating agencies bearing a higher reputation cost when they fail to predict the default of an investment-grade bond.

To differentiate between the rating conservatism and an alternative private information explanation, we provide direct evidence that compared to similar U.S. bonds, cross-listed bond ratings are more likely to be associated with false alarms and are less likely to be associated with a missed default. Moreover, we conclude that the bond market corrects for the rating bias in cross-listed bonds because we find that the issuance yield spread is lower for cross-listed bonds than for similar U.S. domestic bonds. Collectively, the results are consistent with the rating conservatism explanation and inconsistent with the private information explanation.

Our study has several limitations that can be addressed by future research. First, despite our attempts to control for risk and differentiate between the rating conservatism and risk explanation, we acknowledge that fully controlling for risk is impossible to achieve and risk (or other unidentified economic factors) can always be an alternative explanation. Second, our paper is agnostic regarding the tradeoffs rating agencies make in deciding the optimal investment in rating evaluation. While our results imply that it is not cost-effective for rating agencies to invest in additional research to lower the information asymmetry, we do not have direct evidence that this is the case. Our goal is modest, that is, to use cross-listed bonds as a setting of high information asymmetry and document that rating conservatism exists in this setting. Our paper extends the rating conservatism literature (Beaver et al. 2006) by identifying information asymmetry as another explanation for rating conservatism. We provide evidence that rating agencies are more conservative when information asymmetry is stronger.

Our study complements other academic studies on rating properties that tend to focus on accuracy and timeliness (Cheng and Neamtiu 2009) by documenting conservatism in ratings as an additional rating property. Our paper also contributes to a small yet growing literature on the application of conservatism principle outside financial reporting (Lu and Sapra 2009; Hugon and Muslu 2010). Lastly, our paper adds to the very limited research on foreign firms issuing debt in the U.S. by documenting the rating properties of cross-listed bonds and their pricing implications.

Appendix A Numeric coding of rating categories

Numerical	S&P's	Moody's	Fitch's
1	AAA	Aaa	AAA
2	AA+	Aa1	AA+
3	AA	Aa2	AA
4	AA-	Aa3	AA-
5	A+	A1	A+
6	A	A2	A
7	A-	A3	A-
8	BBB+	Baa1	BBB+
9	BBB	Baa2	BBB
10	BBB-	Baa3	BBB-
11	BB+	Ba1	BB+
12	BB	Ba2	BB
13	BB-	Ba3	BB-
14	B+	B1	B+
15	B	B2	B
16	B-	B3	B-
17	CCC+	Caa1	CCC+
18	CCC	Caa2	CCC
19	CCC-	Caa3	CCC-
20	CC	Ca	CC
21	C	C	C
22	D		DDD/DD/D

This table replicates Appendix B in Cheng and Neamtiu (2009). We follow this coding scheme to transform rating categories assigned by Moody's, Standard & Poor's, and Fitch's to numeric numbers used in our analyses. Note that higher values of numeric rating represent worse ratings. Also, we define the initial rating as the first rating assigned to an issue during the first month after the offering date by Standard and Poor's, Moody's or Fitch. If a bond is rated by multiple agencies, we assign the highest of the ratings to the issue.

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Table 1
Annual frequency distribution of cross-listed bonds

Year	Number of issues	Number of countries	Total debt issued In Million Dollars	Average issue size
1990	4	3	800	200
1991	5	3	999	200
1992	19	7	4,257	224
1993	46	12	11,396	248
1994	33	13	7,345	223
1995	59	20	14,885	252
1996	78	20	19,036	244
1997	99	24	22,323	225
1998	83	15	24,973	301
1999	126	22	45,932	365
2000	156	25	198,905	1,275
2001	299	28	280,685	939
2002	209	24	109,068	522
2003	135	24	65,133	482
2004	98	20	39,168	400
2005	66	20	29,724	450
2006	92	20	59,182	643
2007	87	17	65,078	748
2008	67	12	58,455	872
2009	38	14	42,829	1,127
Total	1,799		1,100,172	612

Table 1 presents the number of issues and the number of countries that issuing firms originate from each year and the annual total and average size of fixed-rate non-governmental public debt issues in the U.S. by non-U.S. firms between 1990 and 2009. The total and average issue sizes are in million dollars. The data are obtained from the Mergent Fixed Investment Securities Database. We exclude observations if the spread to benchmark or the offer yield to maturity is missing. We also exclude observations if country-specific or firm-specific information is missing for an issuer.

Table 2
Cross-listed bonds by the country of origin

Country	Number of issues	Total debt issued	Average issue size
Argentina	22	4,228	192
Australia	85	50,356	592
Austria	14	7,957	568
Belgium	8	3,253	407
Brazil	35	17,904	512
Canada	471	185,383	394
Chile	34	8,420	248
Colombia	4	1,445	361
Denmark	4	2,496	624
Finland	17	6,097	359
France	115	125,128	1,088
Germany	76	97,139	1,278
Greece	1	397	397
Hong Kong	26	11,138	428
India	8	4,107	513
Indonesia	12	3,647	304
Ireland-Rep	9	3,037	337
Israel	3	648	216
Italy	24	21,389	891
Japan	14	11,537	824
Malaysia	16	6,818	426
Mexico	63	20,230	321
Netherlands	211	240,415	1,139
New Zealand	5	1,096	219
Norway	33	11,388	345
Peru	4	1,408	352
Philippines	12	2,207	184
Portugal	2	1,592	796
Singapore	18	10,597	589
South Africa	2	3,662	1,831
South Korea	43	14,352	334
Spain	13	15,154	1,166
Sweden	28	12,762	456
Switzerland	17	4,451	262
Thailand	6	1,585	264
United Kingdom	342	186,550	545
Venezuela	2	200	100

Table 2 presents the number of issues and the total and average size of fixed-rate non-governmental public debt issues in the U.S. for each foreign country that issuing firms originate from between 1990 and 2009. The total and average issue sizes are in million dollars. The data are obtained from the Mergent Fixed Investment Securities Database. We exclude observations if the spread to benchmark or the offer yield to maturity is missing. We also exclude observations if country-specific or firm-specific information is missing for an issuer.

Table 3
Descriptive statistics for cross-listed and domestic bonds

	Means			Medians		
	Non-U.S.	U.S.	p-value	Non-U.S.	U.S.	p-value
Issue characteristics						
Issue size	5.897	5.435	0.00	5.853	5.517	0.00
Maturity	2.188	2.265	0.00	2.304	2.304	0.03
Seniority	0.901	0.849	0.00	1.000	1.000	0.00
Callability	0.518	0.650	0.00	1.000	1.000	0.00
Puttability	0.012	0.013	0.80	0.000	0.000	0.80
Default spread	0.940	0.920	0.09	0.830	0.820	0.01
Rating	8.279	8.635	0.00	8.000	8.000	0.00
Spread to benchmark	201.007	178.864	0.00	135.000	123.000	0.00
Offer yield	7.124	7.073	0.00	6.734	6.862	0.01
Issuer characteristics						
Firm size	0.072	0.042	0.00	0.012	0.007	0.00
Leverage	0.284	0.353	0.00	0.265	0.332	0.00
Profitability	0.087	0.070	0.00	0.080	0.064	0.00
Interest coverage	10.722	10.302	0.41	3.674	3.762	0.04
Capital expenditures	0.070	0.063	0.00	0.053	0.048	0.00
Country-specific variables						
Emerging	0.175	0.000	0.00	0.000	0.000	0.00
Civil law	0.449	0.000	0.00	0.000	0.000	0.00
Rule of law	1.477	1.920	0.00	1.970	1.920	0.72
Creditor rights	1.969	1.000	0.00	2.000	1.000	0.00
Judicial efficiency	8.978	10.000	0.00	9.250	10.000	0.00
Ex-ante self-dealing	0.443	0.330	0.00	0.330	0.330	0.00
Ex-post self-dealing	0.708	0.980	0.00	0.980	0.780	0.00
Anti-director rights	4.300	2.000	0.00	4.000	2.000	0.00
Public enforcement	0.502	0.000	0.00	0.500	0.000	0.00
Disclosure requirements	0.666	1.000	0.00	0.583	1.000	0.00
Liability standards	0.625	1.000	0.00	0.660	1.000	0.00
Investor protection	0.596	1.000	0.00	0.537	1.000	0.00
Observations	1,799	6,937		1,799	6,937	

Table 3 presents the descriptive statistics for cross-listed bonds and U.S. domestic bonds. *Non-US* equals one when debt is issued by a non-US firm and zero otherwise. *Issue size* is the natural logarithm of the size of the debt issue in million dollars. *Maturity* is the natural logarithm of the number of years to maturity. *Seniority* equals one when the debt is senior and zero otherwise. *Callability* equals one when the bond includes a call provision and zero otherwise. *Puttability* equals one when the bond includes a put provision and zero otherwise. *Default spread* is the yield difference between AAA- and BAA-rated corporate bonds. *Rating* equals one for firms that have the best credit rating (AAA) and increases by one for successively lower rating categories. *Spread to benchmark* is the difference between the offer yield and the yield of a U.S. Treasury security issued on the same date with comparable maturity. *Offer yield* is the yield to maturity on the offer date. *Firm size* is equal to total assets in billions of dollars. *Leverage* is total debt to total assets. *Interest coverage* is EBIT to interest expenses. *Profitability* is EBITDA to total assets. *Capital expenditures* are capital expenditures to total assets. *Emerging* equals one when the issuing country is defined as being part of an emerging market as defined by Morgan Stanley Capital International. *Civil law* equals one when the legal origin of the issuing country is the civil law. We also include variables capturing country-specific legal characteristics. These variables are *Creditor rights* and *Judicial efficiency* as defined in La Porta et al. (1998), *Ex-ante self-dealing* and *Ex-post self-dealing* as defined in Djankov et al. (2008), *Anti-directors rights* as defined in Spamann (2010) and *Rule of law, Public enforcement, Disclosure requirements, Liability standards* and *Investor protection* as defined in La Porta et al. (2006). We also include industry dummies using Fama and French (1997) industry definitions and year dummies.

Table 4
Initial rating of cross-listed bonds compared to domestic bonds

	Full sample		Non-US sample	
Independent Variables	Coefficient	(p-value)	Coefficient	(p-value)
Non-US	0.78	(0.00)		
Issue characteristics				
Issue size	0.01	(0.92)	-0.34	(0.00)
Maturity	-0.19	(0.00)	-0.18	(0.00)
Seniority	-0.97	(0.00)	-0.95	(0.00)
Callability	0.64	(0.00)	0.45	(0.00)
Puttability	0.21	(0.02)	0.01	(0.94)
Default spread	-0.25	(0.00)	-0.36	(0.02)
Issuer characteristics				
Firm size	-1.74	(0.00)	-1.55	(0.00)
Leverage	1.64	(0.00)	0.95	(0.00)
Profitability	-3.81	(0.00)	-1.93	(0.00)
Interest coverage	0.00	(0.07)	-0.01	(0.00)
Capital expenditures	-0.14	(0.80)	2.27	(0.00)
Country-specific variables				
Emerging	0.52	(0.01)	0.58	(0.00)
Civil law	0.03	(0.92)	-0.36	(0.20)
Rule of law	-0.53	(0.00)	-0.31	(0.02)
Creditor rights	-0.07	(0.29)	0.04	(0.55)
Judicial efficiency	-0.03	(0.59)	-0.09	(0.12)
Ex-ante self-dealing	-0.40	(0.22)	-0.96	(0.00)
Ex-post self-dealing	0.70	(0.08)	0.39	(0.33)
Anti-director rights	-0.30	(0.00)	-0.34	(0.00)
Public enforcement	-0.14	(0.36)	-0.26	(0.06)
Disclosure requirements	-0.86	(0.06)	-1.07	(0.01)
Liability standards	-0.02	(0.95)	-0.65	(0.06)
Investor protection	1.59	(0.00)	1.94	(0.00)
Industry dummies included	Yes	Yes	Yes	Yes
Year dummies included	Yes	Yes	Yes	Yes
Pseudo R-squared	13.22%		17.71%	
Observations	8,736		1,799	

Table 4 presents the results from cross-sectional regressions with *Rating* as the dependent variable. The reported results are based on ordered probit estimation using robust standard errors clustered by issuer. *Rating* equals one for firms that have the best credit rating (AAA) and increases by one for successively worse rating categories. *Non-US* equals one when debt is issued by a non-US firm and zero otherwise. *Issue size* is the natural logarithm of the size of the debt issue in million dollars. *Maturity* is the natural logarithm of the number of years to maturity. *Seniority* equals one when the debt is senior and zero otherwise. *Callability* equals one when the bond includes a call provision and zero otherwise. *Puttability* equals one when the bond includes a put provision and zero otherwise. *Default spread* is the yield difference between AAA- and BAA-rated corporate bonds. *Firm size* is equal to total assets. *Leverage* is total debt to total assets. *Interest coverage* is EBIT to interest expenses. *Profitability* is EBITDA to total assets. *Capital expenditures* are capital expenditures to total assets. *Emerging* equals one when the issuing country is defined as being part of an emerging market as defined by Morgan Stanley Capital International. *Civil law* equals one when the legal origin of the issuing country is the civil law. We also include variables capturing country-specific legal characteristics. These variables are *Creditor rights* and *Judicial efficiency* as defined in La Porta et al. (1998), *Ex-ante self-dealing* and *Ex-post self-dealing* as defined in Djankov et al. (2008), *Anti-directors rights* as defined in Spamann (2010) and *Rule of law*, *Public enforcement*, *Disclosure requirements*, *Liability standards* and *Investor protection* as defined in La Porta et al. (2006). We also include industry dummies using Fama and French (1997) industry definitions and year dummies.

Table 5 Subsequent rating changes of cross-listed bonds compared to domestic bonds

	Likelihood of subsequent rating changes				Frequency of subsequent rating changes				Time before subsequent rating changes			
	Upgrade		Downgrade		Upgrade		Downgrade		Upgrade		Downgrade	
Independent Variables	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Non-US	-0.95	(0.01)	0.35	(0.23)	-0.14	(0.00)	0.05	(0.28)	286.33	(0.01)	-67.30	(0.49)
Issue characteristics												
Initial rating	0.11	(0.00)	-0.07	(0.00)	0.01	(0.00)	-0.01	(0.00)	-15.46	(0.00)	-0.34	(0.91)
Issue size	0.08	(0.04)	0.01	(0.77)	0.01	(0.05)	0.00	(0.35)	-39.99	(0.01)	-28.35	(0.02)
Maturity	0.05	(0.34)	-0.02	(0.49)	0.00	(0.73)	-0.01	(0.19)	-10.37	(0.55)	15.03	(0.18)
Seniority	0.28	(0.00)	0.03	(0.77)	0.02	(0.01)	0.01	(0.56)	-79.20	(0.01)	71.39	(0.01)
Callability	-0.28	(0.00)	0.12	(0.06)	-0.02	(0.00)	0.02	(0.07)	-14.40	(0.58)	19.86	(0.32)
Puttability	-0.05	(0.73)	0.12	(0.41)	0.00	(0.94)	0.03	(0.10)	-15.03	(0.85)	-14.90	(0.78)
Default spread	0.10	(0.53)	0.01	(0.92)	0.00	(0.61)	0.00	(0.91)	36.97	(0.71)	-46.48	(0.51)
Issuer characteristics												
Firm size	0.34	(0.10)	0.31	(0.05)	0.07	(0.00)	0.07	(0.00)	-45.80	(0.31)	-49.90	(0.25)
Leverage	-0.20	(0.20)	-0.03	(0.84)	-0.02	(0.29)	-0.01	(0.67)	-16.16	(0.82)	-20.27	(0.64)
Profitability	-0.67	(0.10)	-0.39	(0.29)	-0.04	(0.36)	-0.06	(0.23)	-15.96	(0.91)	250.52	(0.07)
Interest coverage	0.00	(0.05)	0.00	(0.08)	0.00	(0.02)	0.00	(0.22)	-0.53	(0.35)	-0.19	(0.70)
Capital expenditures	-0.04	(0.93)	0.68	(0.24)	0.04	(0.36)	0.09	(0.15)	-345.24	(0.05)	-225.57	(0.15)
Country-specific												
Emerging	0.16	(0.55)	-0.63	(0.01)	0.06	(0.11)	-0.12	(0.01)	27.40	(0.80)	146.66	(0.16)
Civil law	0.54	(0.10)	0.03	(0.94)	0.06	(0.10)	0.08	(0.19)	-106.61	(0.42)	-43.78	(0.71)
Rule of law	-0.30	(0.08)	-0.15	(0.44)	-0.02	(0.24)	-0.04	(0.21)	10.22	(0.90)	116.41	(0.10)
Creditor rights	-0.10	(0.27)	0.25	(0.00)	-0.01	(0.18)	0.04	(0.00)	18.39	(0.59)	-4.57	(0.89)
Judicial efficiency	0.14	(0.06)	-0.11	(0.15)	0.01	(0.29)	-0.01	(0.57)	18.64	(0.53)	6.65	(0.78)
Ex-ante self-dealing	1.08	(0.02)	-0.83	(0.05)	0.12	(0.02)	-0.04	(0.46)	-49.09	(0.75)	1.89	(0.99)
Ex-post self-dealing	-0.81	(0.19)	0.16	(0.75)	-0.07	(0.21)	0.02	(0.79)	-186.21	(0.40)	-21.99	(0.91)
Anti-director rights	0.30	(0.01)	-0.11	(0.21)	0.04	(0.00)	-0.02	(0.17)	53.59	(0.10)	16.13	(0.64)
Public enforcement	0.17	(0.37)	-0.02	(0.91)	0.03	(0.15)	0.01	(0.72)	172.30	(0.03)	-28.55	(0.64)
Disclosure	1.42	(0.02)	0.57	(0.36)	0.16	(0.03)	0.17	(0.09)	-213.47	(0.30)	-155.29	(0.48)
Liability standards	0.91	(0.06)	-0.65	(0.12)	0.14	(0.03)	-0.10	(0.16)	116.42	(0.57)	-187.79	(0.23)
Investor protection	-0.89	(0.21)	0.78	(0.22)	-0.18	(0.06)	0.14	(0.18)	-92.25	(0.73)	150.78	(0.55)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	13.68%		10.56%		15.15%		10.13%		20.00%		17.15%	
Observations	7,927		7,927		7,927		7,927		1,169		1,986	

Table 5 presents the results from cross-sectional regressions of subsequent rating changes on cross-listed bond indicators. We examine three dependent variables: 1) an indicator variable that takes the value of one if the issue's rating has been upgraded (downgraded) by Standard and Poor's at the end of the three years after the offering compared to the initial rating; 2) the number of upgrades (downgrades) divided by the total number of ratings assigned to an issue by Standard & Poor's during the three years after the offering; and 3) the number of days between the initial rating assigned to an issue by Standard and Poor's and the first subsequent upgrade (downgrade) conditional on the existence of a rating change. The reported results are based on probit estimation for 1) and OLS for 2) and 3) using robust standard errors clustered by issuer. *Non-US* equals one when debt is issued by a non-US firm and zero otherwise. *Issue size* is the natural logarithm of the size of the debt issue in millions of dollars. *Maturity* is the natural logarithm of the number of years to maturity. *Seniority* equals one when the debt is senior and zero otherwise. *Callability* equals one when the bond includes a call provision and zero otherwise. *Puttability* equals one when the bond includes a put provision and zero otherwise. *Default spread* is the yield difference between AAA- and BAA-rated corporate bonds. *Firm size* is equal to total assets. *Leverage* is total debt to total assets. *Interest coverage* is EBIT to interest expenses. *Profitability* is EBITDA to total assets. *Capital expenditures* is capital expenditures to total assets. *Emerging* equals one when the issuing country is defined as being part of an emerging market as defined by Morgan Stanley Capital International. *Civil law* equals one when the legal origin of the issuing country is the civil law. We also include variables capturing country-specific legal characteristics. These variables are *Creditor rights* and *Judicial efficiency* as defined in La Porta et al. (1998), *Ex-ante self-dealing* and *Ex-post self-dealing* as defined in Djankov et al. (2008), *Anti-directors rights* as defined in Spamann (2010) and *Rule of law, Public enforcement, Disclosure requirements, Liability standards* and *Investor protection* as defined in La Porta et al. (2006). We also include industry dummies using Fama and French (1997) industry definitions and year dummies.

Table 6
Ratings for investment and non-investment grade

	Investment grade		Non-investment grade	
Independent Variables	Coefficient	(p-value)	Coefficient	(p-value)
Non-US	1.17	(0.00)	-0.04	(0.92)
Issue characteristics				
Issue size	0.04	(0.36)	-0.24	(0.00)
Maturity	-0.02	(0.49)	-0.52	(0.00)
Seniority	-0.11	(0.43)	-0.90	(0.00)
Callability	0.31	(0.00)	0.65	(0.00)
Puttability	0.28	(0.01)	-0.63	(0.00)
Default spread	-0.23	(0.00)	-0.47	(0.03)
Issuer characteristics				
Firm size	-1.67	(0.00)	-0.02	(0.80)
Leverage	0.82	(0.01)	0.74	(0.00)
Profitability	-3.30	(0.00)	-1.90	(0.00)
Interest coverage	0.00	(0.47)	0.00	(0.48)
Capital expenditures	-1.29	(0.07)	0.15	(0.67)
Country-specific variables				
Emerging	0.13	(0.64)	-0.95	(0.00)
Civil law	0.79	(0.10)	0.49	(0.32)
Rule of law	-0.87	(0.00)	0.16	(0.54)
Creditor rights	-0.07	(0.47)	-0.08	(0.44)
Judicial efficiency	0.00	(0.98)	-0.18	(0.10)
Ex-ante self-dealing	0.27	(0.59)	0.72	(0.11)
Ex-post self-dealing	1.20	(0.01)	-0.40	(0.64)
Anti-director rights	-0.41	(0.00)	-0.24	(0.02)
Public enforcement	-0.03	(0.90)	0.16	(0.55)
Disclosure requirements	-0.06	(0.92)	-1.18	(0.06)
Liability standards	0.37	(0.41)	-0.81	(0.17)
Investor protection	1.61	(0.04)	1.32	(0.09)
Industry dummies included	Yes	Yes	Yes	Yes
Year dummies included	Yes	Yes	Yes	Yes
Pseudo R-squared	8.60%		11.72%	
Observations	6,586		2,150	

Table 6 presents the results from cross-sectional regressions with *Rating* as the dependent variable. The regressions are separately run for investment- and speculative-grade issues. The reported results are based on ordered probit estimation using robust standard errors clustered by issuer. *Rating* equals one for firms that have the best credit rating (AAA) and increases by one for successively lower rating categories. *Non-US* equals one when debt is issued by a non-US firm and zero otherwise. *Issue size* is the natural logarithm of the size of the debt issue in million dollars. *Maturity* is the natural logarithm of the number of years to maturity. *Seniority* equals one when the debt is senior and zero otherwise. *Callability* equals one when the bond includes a call provision and zero otherwise. *Puttability* equals one when the bond includes a put provision and zero otherwise. *Default spread* is the yield difference between AAA- and BAA-rated corporate bonds. *Firm size* is equal to total assets. *Leverage* is total debt to total assets. *Interest coverage* is EBIT to interest expenses. *Profitability* is EBITDA to total assets. *Capital expenditures* is capital expenditures to total assets. *Emerging* equals one when the issuing country is defined as being part of an emerging market as defined by Morgan Stanley Capital International. *Civil law* equals one when the legal origin of the issuing country is the civil law. We also include variables capturing country-specific legal characteristics. These variables are *Creditor right* and *Judicial efficiency* as defined in La Porta et al. (1998), *Ex-ante self-dealing* and *Ex-post self-dealing* as defined in Djankov et al. (2008), *Anti-directors rights* as defined in Spamann (2010) and *Rule of law, Public enforcement, Disclosure requirements, Liability standards* and *Investor protection* as defined in La Porta et al. (2006). We also include industry dummies using Fama and French (1997) industry definitions and year dummies.

Table 7
Likelihood of missing defaults and raising false alarms

	Missed default		False alarm	
Independent Variables	Coefficient	(p-value)	Coefficient	(p-value)
Non-US	-0.71	(0.04)	0.42	(0.00)
Issue characteristics				
Issue size	0.07	(0.20)	0.05	(0.00)
Maturity	-0.18	(0.08)	0.09	(0.00)
Seniority	-0.83	(0.01)	0.28	(0.00)
Callability	0.19	(0.26)	0.14	(0.00)
Puttability	0.39	(0.09)	-0.04	(0.50)
Default spread	0.25	(0.65)	0.18	(0.03)
Issuer characteristics				
Firm size	-1.44	(0.28)	-0.14	(0.20)
Leverage	-0.01	(0.98)	-0.11	(0.15)
Profitability	-7.37	(0.00)	0.46	(0.01)
Interest coverage	-0.01	(0.12)	0.00	(0.00)
Capital expenditures	-2.05	(0.29)	0.11	(0.56)
Country-specific variables				
Emerging			0.12	(0.38)
Civil law			-0.03	(0.89)
Rule of law			0.01	(0.89)
Creditor rights			-0.05	(0.29)
Judicial efficiency			-0.21	(0.00)
Ex-ante self-dealing			0.44	(0.08)
Ex-post self-dealing			0.61	(0.03)
Anti-director rights			-0.11	(0.04)
Public enforcement			-0.03	(0.74)
Disclosure requirements			0.38	(0.19)
Liability standards			0.84	(0.00)
Investor protection			-0.83	(0.02)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies included	Yes	Yes	Yes	Yes
Rating dummies included	Yes	Yes	Yes	Yes
Pseudo R-squared	21.22%		49.45%	
Observations	510		30,013	

Table 7 presents the results from cross-sectional regressions of indicator variables for missed defaults and false alarms as the dependent variables. *Missed default* is an indicator variable that takes the value of one for missed defaults and zero otherwise. Specifically, for a sample of issuers that experience an event of default within one year from the rating date, this variable takes the value of one if a debt issue is investment-grade and zero otherwise. *False alarm* is an indicator variable that takes the value of one for false warnings and zero otherwise. Specifically, for a sample of issuers that do not experience an event of default within one year from the rating date, this variable takes the value of one if a debt issue is non-investment grade and zero otherwise. In *Missed default* regressions, the legal variables are dropped from the specification due to multicollinearity. *Rating* equals one for firms that have the best credit rating (AAA) and increases by one for successively lower rating categories. *Non-US* equals one when debt is issued by a non-US firm and zero otherwise. *Issue size* is the natural logarithm of the size of the debt issue in millions of dollars. *Maturity* is the natural logarithm of the number of years to maturity. *Seniority* equals one when the debt is senior and zero otherwise. *Callability* equals one when the bond includes a call provision and zero otherwise. *Puttability* equals one when the bond includes a put provision and zero otherwise. *Default spread* is the yield difference between AAA- and BAA-rated corporate bonds. *Firm size* is equal to total assets. *Leverage* is total debt to total assets. *Interest coverage* is EBIT to interest expenses. *Profitability* is EBITDA to total assets. *Capital expenditures* is capital expenditures to total assets. *Emerging* equals one when the issuing country is defined as being part of an emerging market as defined by Morgan Stanley Capital International. *Civil law* equals one when the legal origin of the issuing country is the civil law. We also include variables capturing country-specific legal characteristics. These variables are *Creditor rights* and *Judicial efficiency* as defined in La Porta et al. (1998), *Ex-ante self-dealing* and *Ex-post self-dealing* as defined in Djankov et al. (2008), *Anti-directors rights* as defined in Spamann (2010) and *Rule of law, Public enforcement, Disclosure requirements, Liability standards* and *Investor protection* as defined in La Porta et al. (2006). We also include industry dummies using Fama and French (1997) industry definitions and year dummies.

Table 8
Cost of debt

	Full sample		Investment grade		Non-investment grade	
Independent Variables	Coefficient	(p-value)	Coefficient	(p-value)	Coefficient	(p-value)
Non-US	-27.77	(0.03)	-24.54	(0.00)	-18.34	(0.57)
Issue characteristics						
Issue size	-11.81	(0.00)	0.38	(0.65)	-22.84	(0.00)
Maturity	16.25	(0.00)	18.87	(0.00)	-18.64	(0.06)
Seniority	28.46	(0.00)	0.30	(0.92)	40.83	(0.00)
Callability	7.35	(0.01)	9.38	(0.00)	17.65	(0.07)
Puttability	-42.26	(0.00)	-36.12	(0.00)	18.29	(0.44)
Default spread	136.55	(0.00)	126.13	(0.00)	272.77	(0.00)
Issuer characteristics						
Firm size	0.00	(0.06)	0.00	(0.01)	0.00	(0.65)
Leverage	36.75	(0.00)	-2.19	(0.67)	46.99	(0.00)
Profitability	-182.56	(0.00)	-60.06	(0.00)	-187.48	(0.00)
Interest coverage	0.09	(0.10)	-0.01	(0.88)	0.16	(0.38)
Capital expenditures	50.56	(0.02)	30.16	(0.12)	38.06	(0.23)
Country-specific variables						
Emerging	63.94	(0.00)	56.92	(0.00)	-36.18	(0.38)
Civil law	6.97	(0.69)	4.87	(0.71)	119.75	(0.00)
Rule of law	-32.25	(0.00)	-14.07	(0.04)	-39.77	(0.07)
Creditor rights	-11.59	(0.01)	-7.24	(0.03)	-10.03	(0.26)
Judicial efficiency	7.04	(0.14)	2.72	(0.38)	18.48	(0.03)
Ex-ante self-dealing	17.45	(0.49)	-1.45	(0.94)	173.96	(0.00)
Ex-post self-dealing	-69.15	(0.01)	-4.17	(0.82)	-178.85	(0.02)
Anti-director rights	16.80	(0.02)	13.99	(0.02)	13.63	(0.30)
Public enforcement	18.02	(0.06)	2.81	(0.68)	53.18	(0.04)
Disclosure requirements	39.52	(0.23)	-26.16	(0.31)	177.17	(0.02)
Liability standards	69.95	(0.01)	40.68	(0.03)	69.95	(0.20)
Investor protection	-33.63	(0.38)	-4.43	(0.87)	-11.87	(0.88)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies included	Yes	Yes	Yes	Yes	Yes	Yes
Rating dummies included	Yes	Yes	Yes	Yes	Yes	Yes
R-square	66.01%		72.01%		64.39%	
Observations	8,736		6,586		2,150	

Table 8 presents the results from cross-sectional regressions with *Spread to benchmark* as the dependent variable. The reported results are based on OLS estimation using robust standard errors clustered by issuer. *Rating* equals one for firms that have the best credit rating (AAA) and increases by one for successively lower rating categories. *Non-US* equals one when debt is issued by a non-US firm and zero otherwise. *Issue size* is the natural logarithm of the size of the debt issue in million dollars. *Maturity* is the natural logarithm of the number of years to maturity. *Seniority* equals one when the debt is senior and zero otherwise. *Callability* equals one when the bond includes a call provision and zero otherwise. *Puttability* equals one when the bond includes a put provision and zero otherwise. *Default spread* is the yield difference between AAA- and BAA-rated corporate bonds. *Firm size* is equal to total assets. *Leverage* is total debt to total assets. *Interest coverage* is EBIT to interest expenses. *Profitability* is EBITDA to total assets. *Capital expenditures* is capital expenditures to total assets. *Emerging* equals one when the issuing country is defined as being part of an emerging market as defined by Morgan Stanley Capital International. *Civil law* equals one when the legal origin of the issuing country is the civil law. We also include variables capturing country-specific legal characteristics. These variables are *Creditor rights* and *Judicial efficiency* as defined in La Porta et al. (1998), *Ex-ante self-dealing* and *Ex-post self-dealing* as defined in Djankov et al. (2008), *Anti-directors rights* as defined in Spamann (2010) and *Rule of law, Public enforcement, Disclosure requirements, Liability standards* and *Investor protection* as defined in La Porta et al. (2006). We also include industry dummies using Fama and French (1997) industry definitions and year dummies.

Table 9
Rating Conservatism in U.S. bonds

	Quarterly forecast		Quarterly forecast	
Independent Variables	Coefficient	(p-value)	Coefficient	(p-value)
High dispersion dummy	0.32	(0.00)		
Dispersion			0.28	(0.00)
Issue characteristics				
Issue size	-0.27	(0.00)	-0.27	(0.00)
Maturity	-0.31	(0.00)	-0.30	(0.00)
Seniority	-1.32	(0.00)	-1.31	(0.00)
Callability	0.67	(0.00)	0.66	(0.00)
Puttability	0.33	(0.02)	0.29	(0.05)
Default spread	-0.17	(0.03)	-0.17	(0.02)
Issuer characteristics				
Firm size	-1.64	(0.00)	-1.63	(0.00)
Leverage	2.25	(0.00)	2.23	(0.00)
Profitability	-4.04	(0.00)	-4.20	(0.00)
Interest coverage	0.00	(0.22)	0.00	(0.12)
Capital expenditures	-1.04	(0.28)	-0.85	(0.37)
Industry dummies included	Yes	Yes	Yes	Yes
Year dummies included	Yes	Yes	Yes	Yes
Pseudo R-squared	17.05%		16.88%	
Observations	4,096		4,096	

Table 9 presents the ordered probit analysis of conservative rating bias for U.S. bonds. The dependent variable is *Rating* which equals one for firms that have the best credit rating (AAA) and increases by one for successively worse rating categories. *Dispersion* is the standard deviation of quarterly earnings forecasts divided by the absolute value of the mean earnings forecasts. *High dispersion dummy* equals to one if a bond issuer's forecast dispersion is higher than sample median, and zero otherwise. The reported results are based on ordered probit estimation using robust standard errors clustered by issuer. *Issue size* is the natural logarithm of the size of the debt issue in millions of dollars. *Maturity* is the natural logarithm of the number of years to maturity. *Seniority* equals one when the debt is senior and zero otherwise. *Callability* equals one when the bond includes a call provision and zero otherwise. *Puttability* equals one when the bond includes a put provision and zero otherwise. *Default spread* is the yield difference between AAA- and BAA-rated corporate bonds. *Firm size* is equal to total assets. *Leverage* is total debt to total assets. *Interest coverage* is EBIT to interest expenses. *Profitability* is EBITDA to total assets. *Capital expenditures* is capital expenditures to total assets. We also include industry dummies using Fama and French (1997) industry definitions and year dummies.