How Much are Credit Ratings Really Worth?

Armen Arakelyan

Eric Duca

Abstract

In this paper we adopt a new approach to quantify the benefits of credit ratings. We condition on unrated firms having bonds outstanding, and then measure the change in yields around the date that a firm becomes rated. We find that obtaining a rating, even if speculative, reduces borrowing costs. Lower-quality companies benefit more from the certification role of ratings, whereas companies rated investment grade experience an additional drop in yield of up to 48 basis points, supporting the regulatory benefit of ratings. In line with a reduction in information asymmetry, we also find that the liquidity of bonds improves significantly, particularly for those rated speculative. On the other hand, companies rated investment grade experience a stronger expansion in the investor base, lending support to the regulatory benefit of ratings.

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* Armen Arakelyan is from Banco de España (Central Bank of Spain), Calle Alcalá, 48, 28014, Madrid, Spain. Tel.: +34 91 338 5000; E-mail address: armen.arakelyan@bde.es. Eric Duca is from Colegio Universitario de Estudios Financieros (CUNEF), Calle Leonardo Prieto Castro 2, Ciudad Universitaria, 28040, Madrid, Spain. Contact author: Eric Duca: Tel.: +34 914 480 892; fax: +34 915 933 111; E-mail address: ericduca@cunef.edu. The authors thank Bo Becker, Manuel Arellano, Negar Ghanbari, Jeff Shen, Dirk Schiereck, Josep Tribó, and seminar participants at the AEFIN XXIV Finance Forum (2016) , the IFABS conference (2016), the Multinational Finance Association meetings (2016), the World Finance Conference (2016), the Paris Financial Management Conference (2017), the Portuguese Finance Network Forum (2018), for useful comments that helped shape this paper. The views and opinions expressed in this article are those of the authors and do not necessarily reflect those of Bank of Spain. The usual disclaimer applies.

1. Introduction

Credit ratings serve as a single recognizable measure of the relative long-term default risk of a bond, incorporating both public and private information. Companies give significant importance to ratings in their capital structure decisions (e.g. Graham and Harvey, 2001), and pay rating agencies considerable fees to obtain a rating.[1] Investment-grade ratings are particularly desirable, since they enable access to investors who must comply with ratings-based regulations (e.g. Becker and Milbourn, 2011). At the same time many companies obtain speculative-grade ratings, suggesting that they value the certification services of rating agencies, which assess risk and reduce information asymmetry.[2] While previous literature finds support for both of these functions of ratings, the findings are mainly based on samples of companies that are already rated. This study adds to the literature by providing new quantifiable evidence on the relative benefits of these two channels for companies that obtain their first rating. The change in status from unrated to rated provides an ideal experiment to capture the marginal benefits that rating agencies provide, particularly since firms have no preexisting official certification of their creditworthiness.

The main aim of this paper is to empirically measure the importance of credit ratings for bond yields, by focusing on unrated firms that obtain a rating for the first time. Our approach conditions on unrated firms having outstanding debt prior to obtaining a rating, allowing us to capture the change in yield when a rating is subsequently assigned. This methodology differs from recent literature that also documents a relationship between ratings and corporate bond yields, such as Kliger and Sarig (2000), Tang (2009), and Kisgen and Strahan (2010), Bongaerts et al. (2012). Using samples of companies that already have ratings, these studies form conclusions about the value of ratings by examining the reaction of yields to either new information, or changes in the regulatory status of ratings. We contribute to this literature by using a different approach that identifies the impact on yields by focusing on the singular event when a company

[1] According to the fee structure released in 2018 by Standard and Poor's, fees for most U.S. corporate issuers are 6.75 basis points, with a minimum of $100,000.In Europe, Sylvers (2013) cites a fee of around €50,000 euros to obtain a rating, and an annual fee of €30,000 to maintain it.

[2] For instance, Cai et al. (2007) find that speculative ratings account for 75% of initial bond offerings, and 25% of seasoned offerings.

transitions from being unrated to rated. This event provides an ideal setting for us to observe the impact of obtaining a rating for two reasons. First, since the first rating represent a major event, the transition is accompanied by the release of a substantial amount of new information regarding the creditworthiness of an issuer. Second, given that companies have no prior rating, the event captures the full benefits of obtaining a rating, which other studies of firms that already have ratings cannot observe entirely. In particular, we are able to observe whether firms that are better off rated speculative rather than remaining unrated, since they benefit from the certification role of ratings.

The second purpose of this paper is to examine the mechanisms driving the drop in yields. The benefits of being rated vary within our sample and we exploit this heterogeneity to capture the relative importance of the channels through which ratings influence yields. Academic research has identified two main benefits of being rated.[3] First, the information conveyed through ratings reduces information asymmetries and the resulting adverse selection problems between bond issuers and investors (Kliger and Sarig, 2000; Tang, 2009; Cornaggia et al., 2017). While issuers may disclose information themselves, rating agencies provide a certification effect, and can also incorporate additional private information without revealing specific details that might benefit competitors. The second use of ratings is an institutional feature that arises because of investment-based rules and regulations that are linked to ratings, with the intention of limiting risk and facilitating contracting (Kisgen, 2006; Kisgen and Strahan, 2010; Becker and Milbourn, 2011). For instance, many institutional investors such as pension funds and money market funds are restricted in their ability to hold bonds that are rated below investment grade.

Our empirical setting contributes to previous findings on the roles of ratings in two main ways. First, our set-up allows us to test the theoretical prediction that firms with larger information asymmetry should benefit more from the certification role of ratings. . While previous studies find evidence that ratings contain information beyond what is publicly available, they do not directly test whether the value of ratings in reducing information asymmetry is larger for companies that are more prone to asymmetries. In fact, they find that bond yields fall when positive information is revealed. More opaque companies,

[3] Frost (2007) provides an overview of the main benefits of ratings and the ongoing debate on whether ratings are useful in providing information beyond what is publically available.).

however, stand to gain more from the certification role of rating agencies, leading to the prediction that these companies, which are normally assigned a lower rating, should benefit *more* from the certification effect of ratings. Our methodology allows us to capture the positive influence on yields that ratings bring to companies with larger information asymmetry. This is new evidence on the benefits of obtaining a rating that is speculative, helping to explain why many firms are rated speculative.

Second, our empirical approach, which focuses on the first rating a bond is assigned, allows for a test to quantify the marginal impact on yields of obtaining an investment grade rating. Previous papers also document the regulatory benefits of ratings, mainly by using a specific sub-sample of companies that switch between investment grade and speculative. Through our approach, we extend these results by testing for regulatory benefits across the whole spectrum of bonds rated investment grade. Therefore, we generalize previous findings, which were just about switchers, to all companies rated investment grade.

Our identification strategy is designed to specifically isolate the effects of obtaining a rating for firms that are previously unrated. Since we focus on changes in the yield for the same bond around this singular change, the rating event, our methodology allows us to measure the impact on yields, while controlling for confounding effects, such as changes in firm risk or investment opportunities In addition, the rating assignment is not accompanied by a bond issue, so that our event window more accurately isolates the benefits of the rating event.[4] In our cross-sectional analysis we relate the reaction of yields to the regulatory and certification benefits suggested by theory. In further tests, we examine developments in liquidity and bond holdings around the rating date, corroborating the evidence from the analysis of yields.

We empirically evaluate the value of ratings using a sample of 140 unrated bond issuers in North America and Europe. Our results indicate that the assignment of a credit rating lowers the yield of outstanding unrated bonds by an average of 40 basis points. Interestingly, both companies rated investment grade and those rated speculative benefit by a similar amount. This preliminary finding helps explain why credit ratings are popular

[4] Confounding information can arise from the characteristics of the bond offering, such as its pricing.

with a broad spectrum of companies, even lower quality companies rated speculative.[5] The precise way in which these companies benefit are explored in our cross-sectional analysis, where we test whether benefits accumulate either from the certification, or regulatory, role of ratings.

After establishing that obtaining a credit rating has an overall impact on bond yields, we examine the channels through which these benefits occur. In cross-sectional analyses, our regression results suggest that the drop in yields is driven by both the main channels through which ratings add value. We find that ratings confer a benefit through their role in reducing information asymmetry, especially if the issuer is of lower quality. Using the assigned rating to capture quality, we find that an issuer with a lower quality equivalent to a one-rating notch, experiences a reduction of 10 basis points in yields when it obtains a rating This finding sheds light on why having a rating per se, even if speculative, is considered valuable by bond investors: ratings have a certification effect that reduces information asymmetry between lenders and investors. In addition, we also find an additional benefit of obtaining an investment grade rating, which leads to a reduction of around 40 basis points in yields. This is in line with the regulatory benefit documented in previous literature.[6] Overall, our findings support both the certification and regulatory benefits of obtaining a rating.

In robustness tests we control for the possibility that alternative factors are driving the change in yields. For instance, a firm may experience a change in investment opportunities at the exact time it obtains a rating. Another concern is self-selection, which would occur if unobservable benefits unrelated to our main mechanisms motivate only certain companies to acquire a rating. We alleviate these concerns in several ways. First, our cross-sectional results support the certification and regulatory hypotheses, but are hard to reconcile with an explanation based on changing investment opportunities – these would have to increase abruptly at the investment grade threshold and for more opaque firms. In addition, it is unlikely that changes in investment opportunities coincide with the rating

[5] In our sample, unrated companies are more likely to obtain an investment grade rating when they are rated for the first time, as because more speculative companies are missing data.

[6] For instance, Kisgen and Strahan (2010) use a natural experiment to test whether ratings-based regulations affect a firm's cost of capital, documenting a 54 basis point drop in yield for companies that are rated investment grade rather than speculative.

event over our relatively short time window, given that the rating process requires several months of planning.

First, we estimate a shadow rating that captures investor expectations prior to the actual assignment of a rating. On average, we find that the actual rating is broadly in line with the predicted rating that investors expect a priori, suggesting it is unlikely that issuers choose to obtain a rating because of unobservable positive private information. Second, we exploit the cross-sectional variation of our sample and show that the importance of the rating varies as predicted by the underlying theories, thus providing economic substance to our results.[7]

In a final set of results we examine changes in bond liquidity and holdings, finding more evidence that is consistent with the predictions of both the certification and regulatory hypotheses. In line with a reduction in information asymmetry, we find that the liquidity of bonds improves substantially after firms obtain a rating, especially for those rated speculative, which are generally harder to value. For these bonds the spread narrows by twice as much as for investment grade bonds in the quarter after a rating is given, compared with the prior quarter. We also examine the change in bond holdings after a rating assigned, and find significant growth in both the amount of bonds held, and the number of bond investors. Growth in the investor base is larger for companies rated investment grade, however, in line with the regulatory benefit of ratings.

Our empirical approach is less prone to the concerns of previous studies that investigate the underlying mechanisms relating bond yields to ratings. As noted by Kliger and Sarig (2000) and Gonzalez et al. (2004), two common approaches are subject to methodological drawbacks. The first approach looks at the impact on yields of ratings changes, so that each firm acts as its own control.[8] While this approach controls for issue-specific variables, it suffers from other drawbacks, the most significant being that ratings change infrequently. In addition, ratings revisions can be driven by economic events, making it hard to separate these from the influence of the information content of ratings.

[7] In undocumented results we implement a common statistical approach used to control for self-selection, estimating a Heckman (1979) two-stage model. In the first stage we model the likelihood that an unrated firm obtains a rating, and then use this to estimate the inverse mills ratio, which is included in the second stage yield regressions. The main findings in the yield regressions remain robust.

[8] Cantor (2004), Norden and Weber (2004), and Micu et al. (2006) summarize findings about the price implications of ratings changes, broadly concluding that downgrades may influence bond prices. However, they find weaker evidence for upgrades.

The yield reaction in our event window is less likely to be driven by coincidental news, since the assignment of a rating for the first time is a complex process that needs to be planned well in advance.[9] The complexity of the process, when compared with a ratings change, also makes it harder for investors to anticipate the exact rating. An alternative approach relates bond yields to ratings in the cross-section, with the concern being that yields may be influenced by unobservable bond or company fundamentals that are also correlated with ratings. We control for this by focusing on the difference in yields of outstanding bonds for the same firm, in a short window around the rating event that allows less room for changes in security fundamentals. Since the same bond acts as its own control, we reduce the likelihood of an omitted factor being correlated with the value of ratings.

Overall, this paper adds to the literature that examines the value of credit ratings using a new empirical approach to find evidence that ratings impact bond yields through both the certification and regulatory channels. Previous approaches examine whether bond ratings are valuable to firms that *already* have ratings. On the other hand, we measure the impact on yields at the moment that a firm obtains a rating for the *first time*, focusing on the initial rating date of firms. To our knowledge, this is previously undocumented in the literature. Our set-up allows us to quantify the impact on bond yield for companies that get rated, and examine the channels which drive the change.

The results that quantify the value of ratings in certifying an issue and reducing information asymmetry are particularly novel. Most existing empirical literature that documents the informational content of ratings analyses companies that already have ratings, showing that yields tighten when new positive information is revealed in ratings For instance, Kliger and Sarig (2000) and Tang (2009) find evidence using Moody's refinement of its rating system in 1982 as a natural experiment. A unique contribution of our paper is to show that the certification effect is more important for informationally opaque issuers, which see a larger drop in their yields when they receive a rating. We also extend previous work that finds an influence on yields stemming from the regulatory and

[9] This problem is common with studies of ratings revisions, which can occur as a reaction to new macroeconomic news that simultaneously affects a bond's credit risk. In contrast, Standard and Poor's (2008) and Rappaport and Ng (2009) report that the process of obtaining a rating for the first time needs to be planned in advance, and can take several months.

contractual implications of of ratings (e.g., Kisgen and Strahan, 2010; Bongaerts et al., 2012). These findings are mainly based on companies rated at the margin on either side of investment and speculative grade. We extend these results by showing that the impact on yields of regulator-based demand persists across all firms rated investment grade.

Our results also contribute to a strand of literature that examines the importance of ratings for firm behavior and the supply of debt capital. Faulkender and Peterson (2006) find that firms with bond ratings have more access to credit, while Sufi (2009) finds similar results for firms with loan ratings. Firms, in turn, pay particular attention to ratings when managing their capital structure, as reported in the survey of Graham and Harvey (2001), and corroborated by the findings of Kisgen (2006). Sufi (2009) finds similar results for firms with loan ratings. The impact of ratings on the cost of capital is also emphasized in a report by the Securities and Exchange Commission (SEC, 2003), which addresses the role and function of rating agencies. Our findings provide quantifiable evidence on the impact of the channels that influence bond yields and, as a result, access to capital.

The remainder of this paper is structured as follows. In section 2 we develop our hypotheses, which form the base for the empirical methodology outlined in section 3. In section 4 we discuss the data, whereas in section 5 we present our results and main findings. In section 6 we conclude.

2. Hypotheses development

Bond ratings are intended to provide investors with an independent, long-term assessment of the default risk associated with an issue. As noted by White (2010), since being set up in the early 20th century, the three main credit rating agencies have achieved information economies of scale by specializing in gathering and processing information related to a company's creditworthiness. Credit rating agencies base their opinion of credit risk on both public and private information, which they express as a single all-encompassing credit score. Rating agencies enjoy privileged access to confidential information about issuers, which is not available to the public (Becker and Milbourn, 2011). Thus, the rating score assigned to a bond embodies both hard financial information, and a softer indication about the strategic direction of the issuer (Kraft, 2015). Through

ratings, firms can incorporate private information without revealing the specific details that might alert competitors (Kliger and Sarig, 2000; Kisgen, 2006; Tang, 2009).

Issuers are concerned about ratings for two main reasons that can influence their cost of, capital (see, e.g., Kisgen, 2006; Frost, 2007; Cornaggia et al., 2017) Rating agencies can certify an issuer's risk profile, thus reducing information asymmetry and the adverse selection costs faced by investors. Theoretical models discussing this function of credit ratings are presented by Millon and Thakor (1985), and Boot et al. (2006). Alternatively, the acquisition of a rating may reduce bond yields by attracting the capital of investors who follow ratings-based regulations, or by reducing the cost of holding bonds for investors who face contractual and regulatory constraints, such as insurance companies. Based on these two channels through which ratings have yield-specific benefits, our first hypothesis (H1) is that the yield on an unrated bond will, on average, fall when a rating is obtained. The potential benefits of ratings can vary across our sample, providing us with an opportunity to form finer predictions that test the importance of each channel in more depth. We develop these hypotheses next.

The first function of credit rating agencies is to reduce information asymmetry between borrowers and uninformed lenders by acting as financial intermediaries that certify a borrower's risk profile, as in the model of Millon and Thakor (1985). This reduces the contracting costs paid by borrowers facilitating access to the capital of less-informed investors who lack the screening and monitoring skills of rating agencies. In the model of Boot et al. (2006) ratings serve as low-cost coordination mechanisms for investors when their beliefs about an issuer's intentions diverge. Because market participants can easily obtain and interpret them, these ratings commonly serve as contracting benchmarks, enhancing the investability of the bond. The certification usefulness of credit ratings is likely to depend on the ease of assessing the risk profile of a bond offering, with those that foster more divergent beliefs predicted to benefit more. Another reason we expect ratings to be more valuable for lower quality issuers follows from the observation that, once rated, disclosure is more stringent for these companies (e.g. Kisgen, 2006). Hence, the certification signal provided by the rating is costlier and therefore more useful as a mechanism that separates the better and worse offerings. In sum, our second hypothesis proposes (H2) that credit ratings perform an

information dissemination and certification role that should be more valuable for bonds that are of lower quality and harder to evaluate.[10]

Credit ratings can influence the cost and supply of funds available to borrowers in a second way, distinct from the certification and information dissemination channel. Previous literature has documented that bond yields depend on credit ratings as a result of ratings-based investment rules and regulations (e.g., Kisgen, 2010; Bongaerts et al., 2012; Chen et al., 2014). For instance, pension funds, money-market funds, and other institutional investors are restricted from holding debt that is not rated investment grade, while the capital requirements of insurance companies is significantly smaller for investment-grade bonds. These conditions create an investment-grade threshold, below which the supply of funds is constrained. As noted by Kisgen (2006), regulations influence the cost of debt at this threshold, either if the demand for bonds is downward sloping, or if investors require compensation for higher regulatory costs.[11] Following this reasoning, the next hypothesis (H3) posits that companies rated investment grade experience a larger drop in yields than those rated speculative.[12]

The two mechanisms underlying the change in yield when a company is rated also have implications for bond liquidity and ownership. We take advantage of these finer predictions to form further hypotheses that can help distinguish these channels from confounding forces such as unobserved changes in company fundamentals. A corollary of the certification hypothesis is that liquidity is predicted to improve as a result of information production that reduces adverse selections costs (Chen_et al., 2004). Hence we hypothesize (H4) that borrowers rated speculative, which are more prone to information asymmetries, experience a larger increase in liquidity than those rated investment grade. Turning to bond holdings we expect a stronger increase in holdings of companies rated investment grade, as these gain access to the capital of investors who must comply with

[10] Whereas we analyze the importance of the certification role in the bond market, Sufi and Bosche find supporting empirical evidence that ratings are more important for lower-quality and more opaque borrowers in the loan market.

[11] Another regulation-based cost is mentioned in Cantor (2004) and Gonzalez et al. (2004). Fund managers may have limited liability with regard to their bond investments, incentivising them to hold riskier bonds on behalf of underlying investors. Hence, ratings-based rules discipline managers and alleviate thius principal-agent problem between them and investors.

[12] Our sample consists of unrated bond issuers in North America and Europe. Regarding the importance of ratings-based guidelines, survey evidence in Cantor et al. (2007) indicates that they are just as important in Europe as they are in the U.S.

regulation-based rules (H5).[13] While we have highlighted the main predictions of the two channels, our results may be diminished by secondary effects. For instance, opaque borrowers for whom ratings primarily relieve contracting problems, may also benefit from increased access to capital and trading in these bonds Hence, while we expect to see a stronger increase in bond holdings of companies rated investment grade, it is possible that investors in those rated speculative also increase. At the same time, larger inflows into bonds rated investment grade can encourage more trading, increasing liquidity (Chen et al., 2004; Kisgen,_2006; Chen et al., 2014).) Despite these potential overlapping effects, our analysis on liquidity and bond holdings provide further insights into the underlying mechanisms driving the decline in yields when companies are rated.

Our empirical setup, which we discuss in the next section, is designed to capture the relative importance of these two channels. In particular, we focus on unrated companies that have outstanding bonds, but which subsequently obtain a rating, enabling us to first measure the impact of the rating announcement on the bond yield, and then relate it to the underlying mechanisms in cross-sectional analyses.

3. Methodology

The methodology we employ to test our hypotheses consists of two parts. In the first part we start by establishing whether bond yields react when a firm obtains a rating. We then proceed with the main tests of our hypotheses, examining the relative importance for yields of the regulatory role of ratings, as well as their usefulness in reducing information asymmetry. In the second part of our analysis we examine further prediction of the hypotheses for changes in the bond holdings and liquidity before and after the rating event.

Our empirical setup is designed to capture the relative importance of these two channels. In particular, we focus on unrated companies that have outstanding bonds, but which obtain a rating later on, enabling us to measure the impact of the rating announcement on the bond yield. The empirical analysis consists of two components. First, we carry out an event study to measure the impact on the bond yield at the rating date. This provides a preliminary insight into whether ratings are relevant for bond prices. In

[13] Previous literature discusses in more detail why the available supply of capital for bonds rated speculative is more restricted (see e.g., Kisgen, 2006; Chen et al., 2014; Cornaggia et al., 2017).

particular, we capture a cleaner measure of the value of yields for when a bond goes from being unrated to becoming rated, thus attending to a gap in the literature. We then exploit variation in our sample to distinguish between the underlying drivers of the yield reaction. In cross-sectional analysis we use firm and bond-level characteristics to capture the influence of the two hypotheses. The second part of our empirical analysis explores further predictions on bond liquidity and investor holdings, which are a direct result of the channels driving the change in yield.

The first part of our empirical analysis investigates whether borrowing costs decrease when a firm obtains a rating. We measure the effect of being rated by comparing the yields before and after a bond is assigned a rating. Hence, we condition that a company has unrated bonds that are trading. The main variable of interest is the yield reaction of an unrated bond when a company gets rated. The yield reaction is calculated as in Kisgen and Strahan (2010), as the change in yield over the event window, which is measured as follows: we take the difference between the average yield in the period (+7, + 13 days) after the event and the average yield in the period (-30, -14 days) prior to the event. We allow for a two-week gap prior to the event, and a one-week gap after the event to account for the anticipation and adjustment effects, respectively. In robustness tests, we also consider a different window after the event, (+14, +21) to account for further adjustment in the yields to the news about the credit rating. The pre-event window is unchanged.

Typical bond event studies use windows of around one month (e.g., Kliger and Sarig, 2000; Tang, 2009; Kisgen and Strahan, 2010). The length of our chosen window over which we average yields accounts for infrequent trading, which is common with unrated issues. Although unlikely in our short window, it is possible that yields may be influenced by confounding events that coincide with the assignment of a rating. To alleviate this concern, we also use the yield spread, defined as the difference in the yield for the corporate bond and the yield of a domestic government bond with the closest maturity as in Kliger and Sarig (2000).

Next we test whether the change in yield is driven by a reduction in information asymmetry or regulatory benefits, as hypothesized in the previous section. We apply a cross-sectional model that relates the change in yield to independent variables that proxy

for these hypotheses while controlling for other influences. The general multivariate model is specified as follows:

$$\Delta(Yield)_i = \beta_0 + \beta_1 Rating_i + \beta_2 IG_i + \beta_3 X_i + \beta_4 Shadow_i + \varepsilon_i \qquad (1)$$

The dependent variable is the difference in yield over the event-study window during which a bond obtains a rating, as explained above. The intercept will capture any common benefit across all companies that obtain a rating, which can't be explained by observable characteristics. For instance, yields may react to an overall positive signaling effect that companies plan to grow, or a negative signaling effect that companies plan to issue more debt.

The key explanatory variables test our main two hypotheses, the certification and regulatory value of ratings. To test the hypothesis that ratings reduce information asymmetry, we proxy for the value of certification through the rating that the company is assigned (*Rating*). Rating agencies assign better credit ratings to firms that are of higher perceived quality and more informationally transparent. This variable is also used as a proxy for the certification value of ratings by Cai et al. (2007) and Sufi (2009). We expect the benefit of certification to diminish as the quality of the bond increases, following hypothesis 2. We convert ratings into an ordinal scale when estimating regressions.[14] We test for the regulatory benefits by including a dummy variable (*IG*) that takes a value of one for companies that obtain an investment grade rating, and 0 for those rated speculative. We expect the bond reaction to be more negative for companies that obtain an investment grade rating, in line with hypothesis 4.

Following previous literature, we control for firm-specific and bond-specific characteristics that may affect the change in yields separately from the regulatory and certification hypotheses. *X* is a vector of characteristics at time t, representing the latest data available at the end of the fiscal year prior to the initial rating date, and includes: Issue Amount/Total Debt, remaining bond maturity, log Assets, log Sales, Sales Growth,

[14] We derive the numerical ratings by transforming the issue ratings by each CRA from the letter scale to a numerical value (AAA = 1, AA+ = 2, ..., C = 20). Since Moody's uses a different scale than S&P's and Fitch, we translate the rating tier of Moody's to the scale equivalent to S&P's and Fitch by equating the categories as Aaa = AAA, Baa1 = BBB+, etc.

Cash/Assets, PPE/Assets, CAPEX/Assets, EBITDA/Sales, Total Debt/EBITDA, Indicator if EBITDA is negative, a dummy variable for Public/Private companies, a dummy variable for dividend-paying firms.[15]

In order to properly capture whether ratings contain information beyond what is publicly available, we also control for the expectations of investors (*Shadow* in equation 1). For instance, if the assigned rating is better than expected, bond yields are expected to decrease. Such assessments, however, are not directly observable. Hence, we proxy for them by estimating the expected shadow rating based on the methodology used in previous papers (e.g., Kisgen 2006; Baghai et al., 2014), as follows: We fit a rating model by regressing the observed initial ratings for our in-sample companies on a series of control variables, taken at the end of the fiscal year prior to the initial rating date. We follow previous literature when choosing the control variables that can determine ratings. In particular, we include size of assets, sales growth, total debt to assets, profit margin measured as EBITDA to Sales, indicator variable of whether EBITDA is negative, Capex to Assets, net PPE to Assets, and a dummy if the company is public. For instance, to calculate the expected ratings for companies obtaining ratings in 1992 (out-of-sample observation), we use all the sample of unrated-to-rated companies from 1982 to 1991 (in-sample).[16] While 1982 is held constant as the starting year in the estimation model, we only use data up to the year that an unrated bond in our sample obtains a rating. Hence, the model coefficients are updated annually as we move forward in calendar time, but the starting point remains the same. This is similar to how an investor would estimate a shadow rating in practice, using all available observable information.

Subsequently, we plug in the control variables for our out-of-sample companies in 2012 into the previously estimated model. We take the outcome as our predicted rating. Then we repeat the process for each year between 1992 and 2015. We then include the deviation of the actual rating from expected rating in the cross-sectional analysis. If ratings contain additional information then positive deviations indicate a worse rating than expected, and are predicted to cause a positive yield reaction.

[15] To preserve degrees of freedom in our relatively small sample, we only report those variables that are significant in our regressions.
[16] 1982 is the first year in our sample in which we observe unrated companies obtaining ratings.

4. Data

4.1 Sample formation

The data in our analyses come from three sources. We use Dealogic to identify corporate bonds issued up to April 2016 by companies incorporated in Europe, the U.S., and Canada. We exclude financials (SIC 6000-6999) and governmental and quasi-governmental organisations (SIC 9000 and above) from our sample. We then obtain from Thomson, the bond-specific and firm-specific characteristics, including the issuer credit ratings. A company can be rated by any of the three main credit rating agencies (CRAs). The ratings are at issuer level from Moody's, Standard and Poor's, and Fitch. We construct a single measure that is consistent across all CRAs as follows: we obtain the composite rating for each issuer by taking i) the median numerical rating if all three ratings are available, ii) the lower numerical rating if only two ratings are available. If only one CRA rates the firm, we simply take this rating. We derive the numerical ratings by transforming the issue ratings as described earlier. We further exclude companies with no data on company fundamentals at least for the fiscal year prior to the initial rating date. We keep all-time unrated companies in our sample, though. Overall, our initial sample includes 7,400 bond issues by about 1,250 firms. This constitutes the sample we use for calculating shadow ratings, although we impose further conditions for those to be included in regression 1, as outlined next.

For our regression analysis, we require companies to have bonds outstanding when they obtain ratings for the first time. We assume a bond is outstanding if it is issued at least 30 days prior to the initial rating date, the latter being prior to the bond's maturity. This reduced our first stage sample to 716 issues by 302 companies. We collect the data on the yields of outstanding bonds from Bloomberg using BGN and CBBT sources. BGN is a composite based on executable and indicative quotes from multiple contributors, whereas CBBT is based on the available executable contributions. For each bond we keep the yield observations within the 30-day interval around the initial rating date with at least one bond yield observation both prior and after the event. We further exclude bonds that have less than one year left to maturity, unit offerings, convertible bonds, and callable bonds, unless they have a price below 90 percent of par, in which case they are considered as virtually

non-callable (Kliger and Sarig 2000; Tang, 2009).[17] After all filters we apply to the data, we are left with about 150 bond issues by 82 companies for our analyses.[18]

4.2 Sample description

Figure 1 shows the annual distribution of initial ratings for companies that obtain ratings for the first time in North America and Europe. The figure shows that a substantial number of companies obtain a speculative rating, emphasizing their importance in addition to those rated investment grade. The data in Figure 2 confirms this observation, breaking down the ratings by category. From this larger sample, we derive our sub-sample of bonds that had unrated outstanding debt when they obtain a rating, shown in Figure 3. The figure indicates whether unrated bonds obtain an investment grade (IG) or high yield (HY) rating, conditional on the issuer becoming rated for the first time. Data availability is more likely to be limited for speculative rated bonds, particularly the data on bond yields.

<< Please insert Figures 1-3 about here >>

The distribution of the ratings that companies obtain, shown in Figures 2 and 3, is rather even across the investment grade and speculative (high yield) rating categories. The investment grade rating confers regulatory benefits documented in previous literature, and suggests that bonds that are initially unrated are issued by good-quality companies, not only those without access to public debt, in contrast with the findings of Faulkender and Peterson (2006). On the other hand, the rather large number of firms obtaining a high yield grade rating suggests that there is value in obtaining a rating beyond the regulatory benefits.

<< Please insert Figure 4 about here >>

[17] Results are quantitatively similar if the threshold for exclusion is reduced to 80% of par, but the sample size becomes smaller.

[18] Our sample size is comparable to other studies that require data on bond yields. For instance Kisgen (2010) use a sample of 90 bonds, obtained from Bloomberg, while Tang (2009) has a sample of 277 observations.

Figure 4 shows the timeline for the event study employed in our approach, assuming a company obtains a rating for the first time on the 12th of March 2012. Prior to obtaining a rating it had issued an unrated bond on the 6th of April 2009, making it eligible to enter our sample. These bonds were still trading when it obtained a rating, allowing us to measure the reaction in their yield in the event window surrounding the rating date. These results are discussed in the next section.

<< Please insert Table 1 about here >>

<< Please insert Table 2 about here >>

Regarding the company characteristics, we present the summary statistics for bonds in our sample in Table 1. More bonds obtain a first rating that is investment grade (110), compared with those that obtain a high yield rating (36). Investors are to some extent able to assess the riskiness of unrated bonds before a rating is assigned: asset size and sales are both larger, while debt is less, for companies that eventually obtain an investment grade rating. More evidence is obtained from Table 2, which shows the bond characteristics. Issues eventually rated investment grade have a longer maturity, but lower relative issue amount and coupon offered to investors.

5. Results

This section proceeds in two parts. First we investigate whether obtaining a rating reduces the yield on outstanding bonds. We then use cross-sectional analysis to examine whether the change in bond yields can be explained by the regulatory or certification benefits of ratings. We also perform robustness test, taking into account potential selection problems, as well as testing whether the results hold for different event study windows as dependent variables. In the second part we examine the evidence on the underlying drivers of the changes in yields, looking at changes in bond holdings and liquidity that are related to the assignment of a rating.

5.1 Determinants of the change in yields

In this section we present results of our event study. Our focus is on the change in yield of unrated bonds when a company gets rated. This gives us a preliminary indication of the value of ratings for companies that obtain a rating for the first time. We also look at the cross-sectional variation in the event study.

<< Please insert Table 3 about here >>

<< Please insert Figure 5 about here >>

In Table 3 we present the reactions of bonds to obtaining a rating, over various time windows, ranging from 3 weeks before the event to 4 weeks after. All windows show a significantly negative reaction that is similar for those rated investment grade and those rated speculative. We focus on the event window that takes the difference in yields 2 weeks after the event (+7, + 14 days) and 3 weeks prior to event (-31, -14 days) for our main regression analysis. When a company becomes rated, the yield on its unrated debt falls by an average (median) of 39.5 basis points if the rating is investment grade, and 46.2 basis points if it is high yield. These results are shown pictorially in Figure 5. The reduction in the cost of borrowing indicates that ratings are valued by investors across rating categories. Net we run cross-sectional regressions to disentangle the underlying reasons for the drop in yields.

<< Please insert Table 4 about here >>

In Table 4 we run regressions with the dependent variable being the change in yield over the event window ranging from 3 weeks before to two weeks after the rating is assigned. As we have multiple bond issues by the same firm, we follow Kisgen and Strahan (2010) and we cluster standard errors by firm in our regressions analysis. The numerical rating variable enters all specifications with a negative coefficient, indicating that companies that are rated worse experience a *larger* reduction in the yield on their unrated debt when they obtain a rating. Insofar as the numerical rating captures information asymmetry, this result suggests that companies with larger information asymmetry benefit

more from obtaining a rating. This lends support to the hypothesis that ratings reduce information asymmetry between lenders and investors. It also helps understand why a significant number of companies choose to obtain a rating even though the rating is not investment grade. On the other hand, the dummy for investment grade bonds has a negative coefficient that is around 40 basis points. This finding provides support for the regulatory value of ratings (see, e.g., Kisgen, 2010). It shows that ratings are priced in addition to the information they provide to the market.

We also control for the difference between the actual and expected (shadow) rating. As expected investors react positively if firms are assigned a rating that is better than they expect. Regarding bond-level controls, the positive coefficient for larger issue amounts suggests that firms with less information asymmetry problems benefit less from obtaining a rating.

<< Please insert Table 5 about here >>

In Table 5 we use a slightly longer window to calculate the change in yields, taking the difference between the average available yield 3 weeks before the event (-30, - 14 days), to 3 weeks after (+14, 21 days). Consistent with Table 3, the numerical rating variable enters all specifications with a negative coefficient, while the investment grade dummy has a negative coefficient.

5.2 Changes in liquidity and bond holdings

The findings in the previous section suggest that ratings benefit companies in two ways: companies more prone to information asymmetries benefit mainly from the certification effect, whereas those that obtain an investment grade rating benefit from the regulatory role of ratings. In the next section we perform further analyses to test these hypotheses more robustly, analyzing the change in liquidity and bond holdings around the rating date.

As noted by Kisgen (2006), regulations increase the cost of debt either if the demand for bonds is downward sloping, or if investors require compensation for higher

regulatory costs. Hence we expect bonds rated investment grade to experience an increase in bond holdings. Under the information asymmetry hypothesis, ratings allow bonds to be purchased by less informed investors. Hence, companies with more information asymmetry are predicted to experience a larger increase in bond ownership. In addition, the decrease in information asymmetry should have a direct influence on spreads and liquidity, apart from an indirect effect from increase demand either from uninformed investors or from better investibility.

<< Please insert Table 6 about here >>

In Table 6 we show the change in the liquidity of outstanding unrated bonds around the date that the firm obtains a rating. We use two measures of the bid-ask spread, constructed as in Schestag et al. (2016). The CBBT measure is based on the Composite Bloomberg Bond Trade (CBBT), which uses executable quotes to calculate the spread, whereas the BGN measure is based on the Bloomberg Generic Quote. Schestag et al (2016) note that the CBBT proxy captures transactions costs more accurately, but the BGN measure is the most popular proxy in academic studies. In fact, we have a larger sample when using the BGN measure.

In line with a reduction in information asymmetry, we find that the liquidity of bonds improves substantially after a firm obtains a rating, especially for those rated high yield. For these bonds the CBBT bid-ask spread narrows across all windows. In terms of medians, the reduction in spreads is much higher than for investment grade bonds experience over all periods. With regard to the BGN proxy, the findings are less pronounced but generally consistent with those of the CBBT measure.

<< Please insert Table 7 about here >>

In Table 7 we examine the change in bond holdings after a company is rated, using date obtained from Bloomberg, which reports on the public holdings of institutions. We find significant growth in both the amount of holdings and the number of investors. For instance the amount of bonds held in companies rated investment grade increases by 21.4%

in the quarter following the assignment of a rating, when compared with the holdings two quarters prior to the assignment of a rating. This compares with a smaller increase in holdings from those rated high yield, with the difference being even larger when considering the change from one quarter prior to a rating. The results for the number of bond holders, shown in the lower half of the table, are in line with these findings. Overall, the results suggest that the investor base expands more rapidly for companies rated investment grade, consistent with the regulatory benefit of ratings.

6. Conclusions

Ratings are valuable to companies if they either reduce information asymmetries between investors and issuers, or alleviate contracting costs associated with regulatory requirements. However, the empirical evidence on the value of having a rating is mixed. In this paper we measure the benefits of obtaining a credit rating for the first time. We focus on firms that initially issue unrated bonds, but subsequently obtain a rating. We quantify the effects of being rated through the changes in yields in the unrated bonds around the date that a firm becomes rated.

The main advantage of our approach is that we capture the effects on yields at the moment that a firm obtains its *first* rating, having previously not been rated. This is a cleaner measure of the impact of being rated compared with studies that examine changes in yields for bonds that are already rated. Our event-study approach focuses on changes in yields for the same bond, which controls for bond- and firm-specific risk factors, reducing concerns about omitted variables associated with previous empirical studies. The results are also less likely to be affected by other confounding news, given that we focus on a short event window. Our sample consists of unrated bond issuers in the North American and European markets, which contains a broad range of issuer risk profile, both speculative and investment grade.

We find that, while most companies obtain an investment grade rating when they are rated for the first time, a sizeable number also obtain high-yield ratings, even though they would initially seem are less desirable. In regression results we shed light on this behavior, showing that obtaining a rating, even if speculative, reduces borrowing costs. We find that lower-quality companies benefit more from the certification role of ratings,

lending support to the hypothesis that ratings reduce information asymmetry between lenders and investors. On the other hand, we also find an additional benefit of obtaining an investment grade rating, which leads to a reduction of up to 48 basis points in yields. This provides support for the regulatory benefit of ratings.

We find further evidence supporting both the certification and regulatory hypotheses. In line with a reduction in information asymmetry, we find that the liquidity of bonds improves substantially after a firm obtains a rating, particularly for those rated speculative. We also find significant growth in bond holdings after a company is rated, especially for companies rated investment grade, in line with the regulatory benefit of ratings. Overall, we provide new findings, in quantifiable terms, supporting both the certification and regulatory benefits of obtaining a rating. These results contribute to a body of research that examines whether credit rating agencies play a meaningful role in financial markets.

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Figure 1: Distribution of Initial ratings by year: This figure shows the annual number of companies obtaining an Investment Grade (IG) or High Yield (HY) rating in North American and Europe, conditional on them becoming rated for the first time.

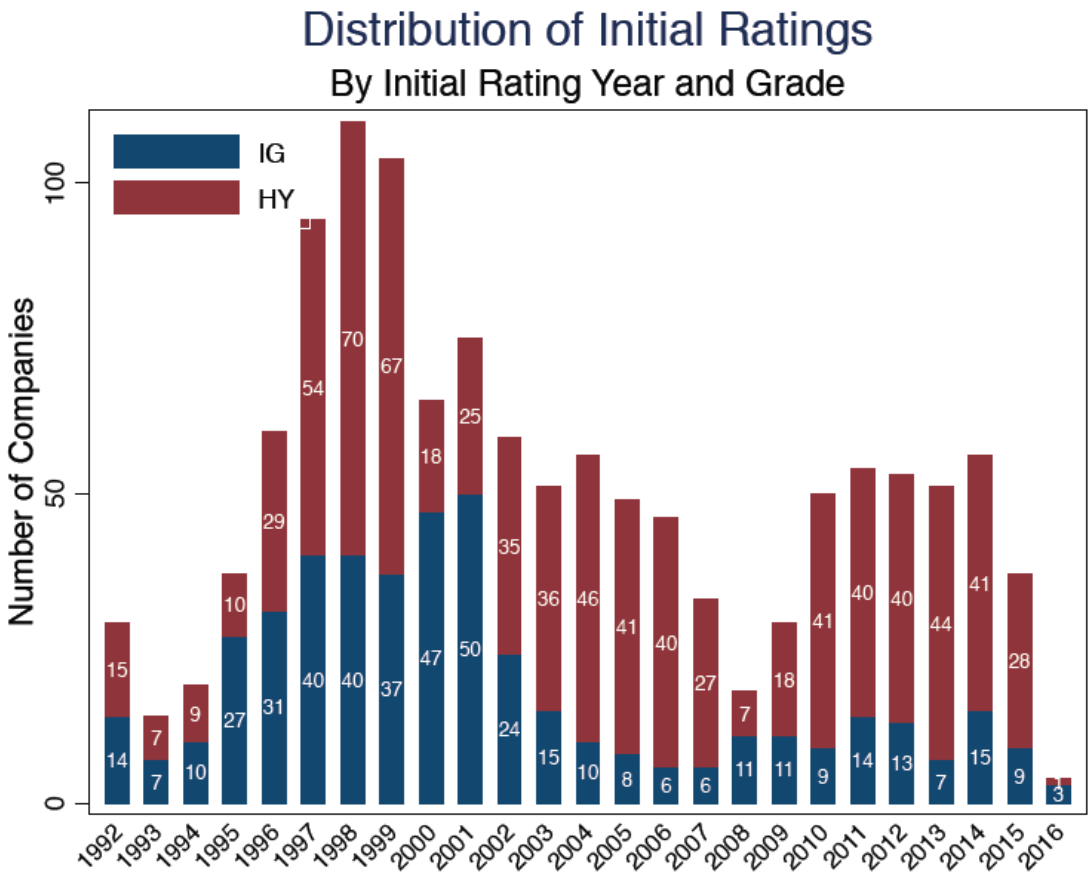

Figure 2: Distribution of Initial ratings by category: This figure depicts the rating that an issuer is given when it first obtains a rating. The number of companies obtaining each rating category is shown on the y-axis. We derive the numerical ratings by transforming the issue ratings by each CRA from the letter scale to a numerical value (AAA = 1, AA+ = 2, ..., C = 20). Since Moody's uses a different scale than S&P's and Fitch, we translate the rating tier of Moody's to the scale equivalent to S&P's and Fitch by equating the categories as Aaa = AAA, Baa1 = BBB+, etc

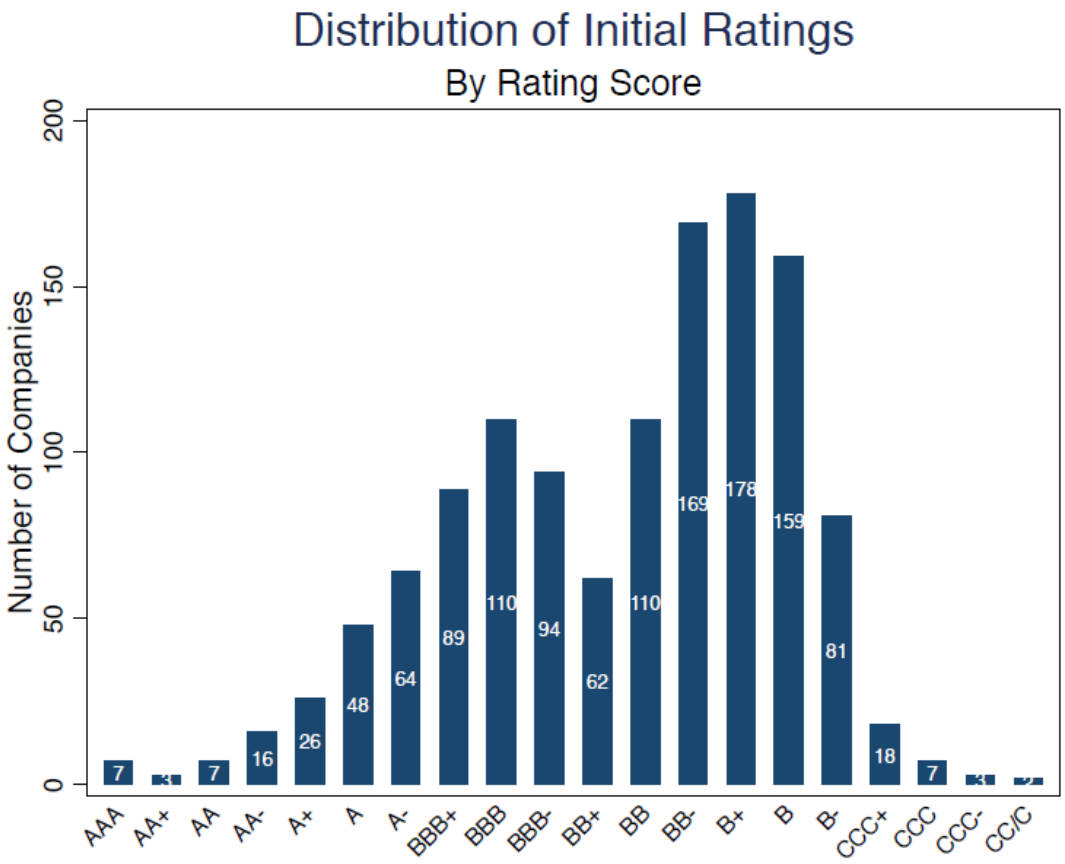

Figure 3: Distribution of initial ratings for our sample: This figure depicts the rating that an issuer is given when it first obtains a rating, conditional on the issuer having unrated bonds outstanding. This constitutes the sample used in the cross-sectional regressions. The number of companies obtaining each rating category is shown on the y-axis. We derive the numerical ratings by transforming the issue ratings by each CRA from the letter scale to a numerical value (AAA = 1, AA+ = 2, ..., C = 20). Since Moody's uses a different scale than S&P's and Fitch, we translate the rating tier of Moody's to the scale equivalent to S&P's and Fitch by equating the categories as Aaa = AAA, Baa1 = BBB+, etc

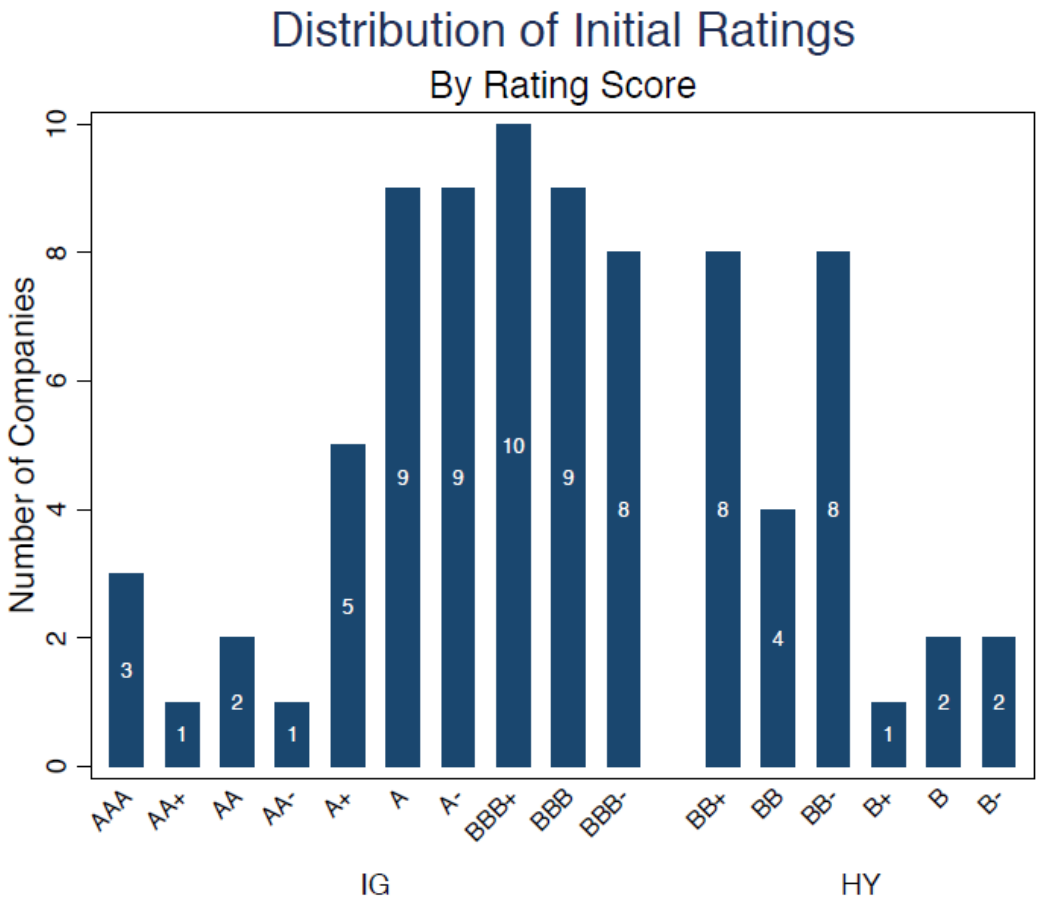

Figure 4: Timeline for the Event Study. The figure illustrates the timeline used for our event study.

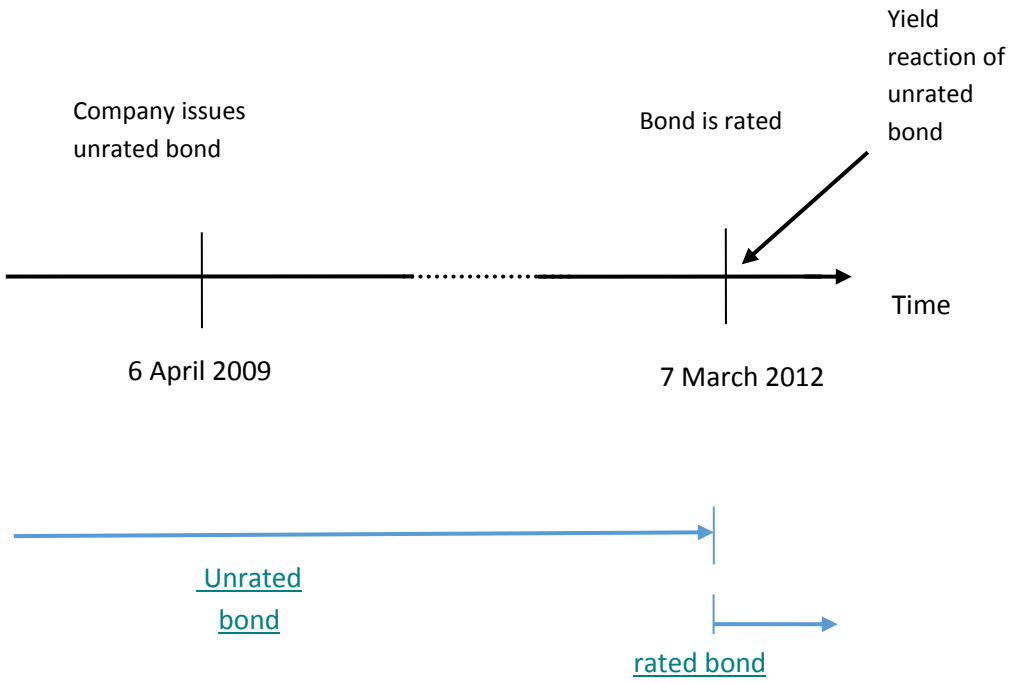

Figure 6: Overall Yield Reaction: This figure shows the reaction in the yield of unrated bonds in the event window surrounding the rating date. We show separate reactions for those eventually rated Investment Grade (IG) and High Yield (HY).

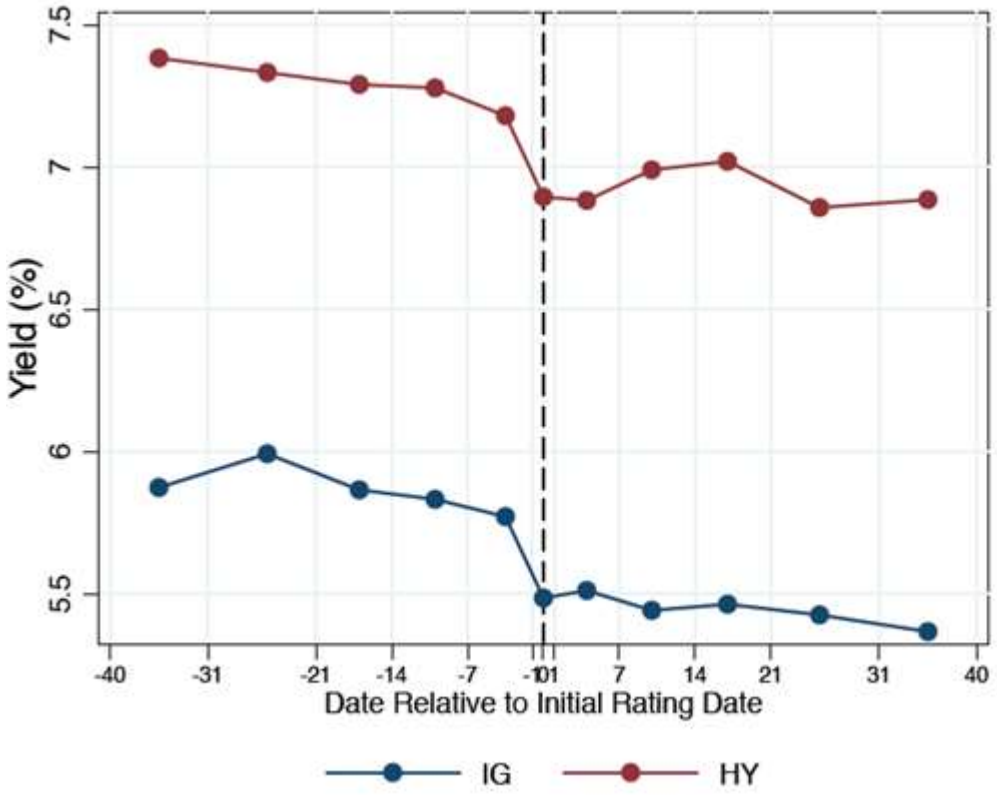
Yield (%)
7.5
7
6.5
6
5.5
-40
-31
-21
-14
-7
-1
1
7
14
21
31
40
Date Relative to Initial Rating Date
IG
HY

Table 1: Firm-level summary statistics: This table shows the firm characteristics for issuers that obtain a rating for the first time, conditional on them having unrated bonds outstanding. This constitutes the sample used in the cross-sectional regressions. IG refers to those issuers that obtain an investment grade rating, whereas HY shows those that obtain a high yield rating.

	IG			HY			Total	
	N	Mean	Median	N	Mean	Median	N	Mean	Median
Act. Rating	110	6.42	7.00	36	12.50	12.00	146	7.92	8.00
Exp. Rtg	110	7.35	7.04	36	10.39	10.68	146	8.10	8.14
Act. - Exp. Rtg	110	-0.93	-1.04	36	2.11	2.37	146	-0.18	-0.14
Log Assets	110	9.58	9.70	36	8.58	8.79	146	9.34	9.38
Log Sales	110	9.28	9.62	36	8.02	8.46	146	8.97	9.30
Total Debt/Assets (%)	110	27.22	25.13	36	37.81	37.17	146	29.83	27.67
EBITDA/Sales (%)	110	22.06	19.93	36	23.23	11.96	146	22.35	19.11
Total Debt/EBITDA	110	2.25	1.72	36	4.45	3.05	146	2.79	1.95
Net PPE/Assets (%)	110	41.64	42.38	36	40.94	36.23	146	41.47	42.20
CAPEX/Assets (%)	110	7.43	5.92	36	8.45	3.97	146	7.68	5.47
Cash/Assets (%)	110	5.23	2.86	36	6.66	4.89	146	5.58	3.76

Table 2: Bond-level summary statistics: This table shows the bond-level characteristics for issuers that obtain a rating for the first time, conditional on them having unrated bonds outstanding. This constitutes the sample used in the cross-sectional regressions. IG refers to those issuers that obtain an investment grade rating, whereas HY shows those that obtain a high yield rating.

	IG			HY		
	N	Mean	Median	N	Mean	Median
Maturity (yrs)	110	13.39	8.83	36	8.63	7.09
Bond Age (yrs)	110	3.07	2.29	36	2.36	1.29
Remain. Mat. (yrs)	110	10.31	5.84	36	6.27	4.53
Coupon Rate (%)	110	6.30	6.53	36	7.73	7.44
ln(Issue Amount in USD)	110	5.77	5.70	36	5.82	5.79
Issue Amount/Assets (%)	92	7.57	3.74	32	18.33	8.69

Table 3: Yield reaction: This table shows the change in the yield for issuers that obtain a rating for the first time, conditional on them having unrated bonds outstanding. This constitutes the sample used in the cross-sectional regressions. IG refers to those issuers that obtain an investment grade rating, whereas HY shows those that obtain a high yield rating. The yield reaction is measured in basis points over various event windows, ranging from three weeks prior to the event to four weeks after the event. The yield prior to the event is averaged over a one-week period to allow for infrequent trading. Similarly, the yield following the event is also averaged over a one-week period.

	IG			HY		
	N	Mean	Median	N	Mean	Median
Post W1 - Pre W3	109	-39.58	-27.40	35	-46.21	-27.50
Post W2 - Pre W3	110	-41.17	-22.35	36	-35.54	-23.80
Post W3 - Pre W3	107	-42.22	-24.00	35	-40.53	-18.90
Post W4 - Pre W3	106	-50.40	-29.45	31	-41.96	-20.30

Table 4: Determinants of the change in yield: This table shows the cross-sectional regressions with the dependent variable being the change in yield over the event window, calculated as follows: we take the difference between the average yield in the period (+7, + 13 days) after the event and the average yield in the period (-30, -14 days) prior to the event. Explanatory variables are taken from Tables 1 and 2, but, to preserve degrees of freedom in our relatively small sample, we only report those variables that are significant in our regressions. The rating dummy takes a value of 1 for bonds that obtain an initial rating of investment grade, and a value of 0 for high-yield ratings. *t*-statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rtg (1=AAA,...,20=CC/C)	-4.36***	-9.27***	-8.72***	-12.82***	-14.01***	-18.10***	-17.66***
	(-3.30)	(-2.85)	(-2.99)	(-2.79)	(-2.75)	(-3.02)	(-2.93)
Act. - Exp. Rtg		10.51**		9.86**	9.87**	14.72**	13.04*
		(2.16)		(2.13)	(2.01)	(2.18)	(1.95)
Rating Grade (1=IG/0=HY)			-48.09**	-42.39*	-45.57*	-35.41*	-39.52**
			(-2.00)	(-1.92)	(-1.78)	(-1.83)	(-2.05)
Remain. Mat. (yrs)					0.15		0.04
					(0.54)		(0.14)
Issue Amount/Total Debt (%)					0.05**		0.08**
					(2.60)		(2.10)
Log Assets						-3.48	1.27
						(-0.60)	(0.20)
Total Debt/Assets (%)						1.71	2.28
						(1.44)	(1.55)
Public (1=Yes/0=No)						-8.18	-11.36
						(-0.52)	(-0.82)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	No
N	146	146	146	146	124	146	124
R-squared	0.10	0.13	0.12	0.14	0.15	0.19	0.11

Table 5: Robustness for determinants of the change in yield: This table shows the cross-sectional regressions with the dependent variable being the change in yield over the event window, calculated as follows: we take the difference between the average yield in the period (+14, + 21 days) after the event and the average yield in the period (-30, -14 days) prior to the event. Explanatory variables are taken from Tables 1 and 2, but, to preserve degrees of freedom in our relatively small sample, we only report those variables that are significant in our regressions. The rating dummy takes a value of 1 for bonds that obtain an initial rating of investment grade, and a value of 0 for high-yield ratings. *t*-statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rtg (1=AAA,...,20=CC/C)	-5.26***	-9.58***	-9.63***	-13.09***	-15.38***	-18.28***	-18.58***
	(-3.10)	(-2.87)	(-3.06)	(-2.82)	(-2.85)	(-2.90)	(-2.95)
Act. - Exp. Rtg		9.20*		8.47*	8.34*	13.55*	12.09*
		(1.93)		(1.88)	(1.73)	(1.93)	(1.77)
Rating Grade (1=IG/0=HY)			-48.11*	-42.43*	-51.27*	-34.21*	-40.32**
			(-1.97)	(-1.89)	(-1.94)	(-1.67)	(-2.08)
Remain. Mat. (yrs)					0.32		0.15
					(1.12)		(0.45)
Issue Amount/Total Debt (%)					0.05***		0.08**
					(2.75)		(2.15)
Log Assets						-2.47	3.08
						(-0.43)	(0.47)
Total Debt/Assets (%)						1.78	2.34
						(1.44)	(1.57)
Public (1=Yes/0=No)						-6.48	-15.43
						(-0.35)	(-0.90)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	No
N	145	145	145	145	123	145	123
R-squared	0.09	0.12	0.11	0.13	0.14	0.17	0.12

Table 6: Liquidity developments around rating dates

This table shows changes in bid-ask spreads of unrated bonds around the date that a company becomes rated. The CBBT measure is based on the Composite Bloomberg Bond Trade (CBBT), which uses executable quotes to calculate the spread, whereas the BGN measure is based on the Bloomberg Generic Quote. The methodology follows Schestag, Schuster, and Uhrig-Homburg (2016). The table reports the difference between the quote 1, 2, and 3 months after the rating date (Post 1M, Post 2M, and Post 3M, respectively) and 1 month before (Pre 1M).

Bloomberg Source: BGN

	Panel A: Investment Grade			Panel B: High Yield		
	N	Mean	Median	N	Mean	Median
Post 1M - Pre 1M	105	-0.020	-0.004	40	0.018	0.007
Post 2M - Pre 1M	95	-0.014	-0.006	36	-0.055	-0.003
Post 3M - Pre 1M	91	-0.017	-0.002	38	-0.021	-0.011

Bloomberg Source: CBBT

	Panel A: Investment Grade			Panel B: High Yield		
	N	Mean	Median	N	Mean	Median
Post 1M - Pre 1M	23	0.001	0.016	11	-0.114	-0.096
Post 2M - Pre 1M	24	-0.038	-0.002	12	-0.038	-0.065
Post 3M - Pre 1M	22	-0.084	-0.020	11	-0.088	-0.134

Table 7: Changes in bond holdings around rating dates

This table shows percentage changes in the amount held (measured in domestic currency), and number of holders, of public bond holdings by institutions, around the date that a company becomes rated. The data are collected from Bloomberg, using the report sheets for each bond. The table reports the percentage difference between the holdings 1 quarter after the rating date (1Q post) and 1 or 2 quarters before (1Q pre and 2Q pre respectively).

	Panel A: Investment grade (N=59)			*Panel B:* High yield (N=43)		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
% change in volume						
2Q pre to 1Q post	21.39	8.62	5.93	16.40	5.36	8.57
1Q pre to 1Q post	18.57	5.31	5.26	8.14	1.49	7.10
% change in holders						
2Q pre to 1Q post	29.41	11.76	6.75	23.28	9.38	8.15
1Q pre to 1Q post	24.42	5.56	5.48	7.34	2.76	5.53