Credit Ratings and Corporate Information Production: Evidence from Sovereign Downgrades

Sicong Wang and Wensi Xie*

Abstract

Exploiting exogenous variations in corporate ratings due to sovereign credit downgrades and sovereign ceiling policies, we assess how firms respond to a reduction in credit ratings. We find that firms bounded by the sovereign ceiling significantly increase information production in response to a sovereign downgrade. The effects are stronger for firms relying more heavily on external finance and operating in a more opaque environment. Enhanced information production, in turn, affects firms' subsequent access to bond markets. These findings suggest that firms actively manage information environments to maintain access to public debt markets.

Keywords: Credit Ratings, Sovereign Downgrade, Information Production, Bond Markets

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* Corresponding author, Xie: Department of Finance, CUHK Business School, Chinese University of Hong Kong, Hong Kong. Email: wensixie@cuhk.edu.hk. Tel: 852-39439287. Wang: Department of Finance, Fisher College of Business, the Ohio State University, Ohio. Email: wang.12851@osu.edu. Tel: 614-247-8905.

1. Introduction

Existing research shows that credit rating affects corporate financial and investment policies (e.g., Graham and Harvey 2001; Kisgen and Strahan 2010; Ellul et al. 2011; Harford and Uysal 2014; Almeida et al. 2017). In practice, credit rating agencies produce material information that reduces information asymmetries between bond issuers and investors, and almost all large corporate bond issuances are rated by at least one rating agency (Kliger and Sarig 2000; Jorion et al. 2005; Agarwal, Chen, and Zhang 2016). Thus, credit rating is one of the most important factors considered by CFOs when making debt policies (Graham and Harvey, 2001). Given the importance of credit ratings to financial policies, we examine how credit rating affects corporate information production, with repercussions on firms' cost of capital.

Establishing a causal link between corporate ratings and information production is challenging, as a firm's ratings could be influenced by other factors, such as credit risk (Xia 2014) or agencies' rating strategies (Fulghieri, Strobl, and Xia 2013), which simultaneously shape the firm's disclosure decisions. Information produced by a firm can also reversely affect the uncertainty of its credit quality and bond ratings (Akins 2018; Bonsall and Miller 2017). To isolate the effects of ratings, we use a quasi-natural experiment that generates plausibly exogenous shocks to corporate ratings. Following Adelino and Ferreira (2016) and Almeida et al. (2017), we exploit exogenous variations in corporate ratings induced by sovereign rating downgrades events and sovereign ceiling policies, and assess the effects of a reduction in ratings on corporate information production.

The sovereign ceiling policies used by major credit rating agencies stipulate that corporate ratings should be lower than the sovereign rating of the country of domicile, as a firm's capacity to fulfill its foreign currency debt obligation is subject to the exchange and

capital control risk when facing sovereign distress.[1] Borensztein, Cowan, and Valenzuela (2013) show, and we confirm in our analyses that the sovereign ratings serve as a strong upper bound for firm ratings. Thus, under the ceiling rule, firms originally rated at or above (i.e., bound firms) the sovereign rating are more affected by a sovereign downgrade event than firms originally rated below the sovereign rating (i.e., unbound firms), because bound firms face a greater probability of rating downgrades as a consequence of sovereign downgrades. Using the pre-existing asymmetric exposure to a sovereign downgrade between bound and unbound firms, our empirical strategy compares information production behaviors by bound and unbound firms around a sovereign downgrade.

Our empirical strategy relies on two building blocks, which are established in previous research and verified in this study. First, Almeida et al. (2017) show that the probability of corporate downgrades in the month of a sovereign downgrade is significantly higher for bound firms (i.e., firms with credit ratings equal to or higher than their sovereign ratings) than unbound firms. Second, they discover a significant increase in the cost of debt for bound firms subsequent to a sovereign downgrade. We find consistent results with Almeida et al. (2017). In particular, we confirm in our context that bound firms experience a 32 – 36% higher likelihood of a rating downgrade, and a 30 – 40 % increase in the cost of debt following a sovereign downgrade. These empirical regularities suggest that compared with unbound firms, bound firms (a) face a higher probability of obtaining a rating downgrade, and (b) suffer an increase in the cost of debt as a consequence of a sovereign downgrade. In this way, a sovereign downgrade triggers a sharp discontinuity in ratings reductions across bound and unbound firms due to the sovereign ceiling rule, with bound firms as the treated group and unbound firms as

[1] Although the recent rating methodology allows for exceptions allowing firms to pierce the ceiling, such exceptions are very rare.

the control group. Based on these building blocks, we evaluate the impact of sovereign downgrades on bound firms' voluntary information production.

To enhance the comparability between the treated and control group, we implement a nearest neighbor matching approach based on Mahalanobis distance. Mahalanobis distance measures how far away two vectors of covariates are from each other, which is equivalent to the Euclidean distance of two vectors scaled to unit variance. In particular, for each of bound firms in the year of a sovereign downgrade, we find up to ten closest matched firms from the non-bound firms in the same country and year that are similar along key firm (pre-treatment) characteristics, namely *Size, Leverage, Cash Ratio*, and *ROA*. Our matched sample contains 2,070 firm-year observations, among which 384 are bound-firm-year observations and 1,686 are non-bound-firm-year observations.

Using the matched sample in a difference-in-differences framework, we examine how treated firms (i.e., bound firms) adjust their information production in response to sovereign downgrades. We measure information production using a form of voluntary disclosure, the frequency and timeliness of forward-looking guidance issued by management. Compared to financial reporting mandated by regulations, voluntarily disclosure is at the full discretion of firm managers. As we focus on how treated firms respond to ratings reductions, forward-looking guidance voluntarily issued by firms are suitable to measuring firms' voluntary disclosure strategy.

We find that the intensity of corporate guidance issued by a treated firm increases by 35 – 52% of the sample mean value of the *Frequency* of guidance in the year of a sovereign downgrade. Besides, the average time distance between a guidance issuance date and the corresponding forecast period end date increases by about 30% more of the sample mean value of forecasting *Horizon* for the treated firms than the control firms. These results suggest that

ratings reductions induce firms to provide more information, and in a more timely manner, to the market.

We next examine the dynamic effects of sovereign downgrades on individual firms' information production. Besides testing whether changes in corporate disclosure patterns happen before the treatment, this approach allows us to observe whether the sovereign downgrades have a transitory or an enduring effect on corporate information production. We find that (a) neither the *Frequency* nor the *Horizon* of forward-looking guidance exhibits any pre-treatment trends, and (b) that the disclosure-enhancing effects of sovereign downgrades for the treated firms primarily take place mainly in the year of the treatment.

There might be concerns that our findings are driven by factors other than the discontinuity in ratings downgrade across bound and unbound firms. One concern is related to differences in pre-treatment firm characteristics between the treated and control group. We highlight three points to alleviate this concern. First, the treated and control firms in our sample are matched based on a number of firm characteristics, namely size, leverage ratio, profitability, and cash holding. Second, we further show that the treated firm are similar to the non-treated matched firms in the year prior to a treatment using other firm performance measures, including sales and earnings. Third, our dynamic analyses show that the disclosure-increasing effects of sovereign downgrades take place only in the year of the shock, not before the shock, suggesting that the parallel trend requirements are fulfilled. These results help alleviate the concerns that the differential effects on disclosure between bound and unbound firms are caused by the differential trends in firm fundamentals or credit risk between these two groups of firms, confounding our interpretation of the results.

Another concern is that the bound and unbound firms may be affected differently by the contemporaneous deterioration in macroeconomic conditions. We first note that if there were any differential macro effects, high-quality firms (the treated group) should be less

affected than low-quality firms (the control group). Nevertheless, we use three strategies to mitigate this concern. First, we separately control for time-varying macroeconomic indicators, namely *GDP Growth*, *GDP per capita*, and *CPI*, as well as the interaction of each of these macroeconomic indicators with the treatment dummy, to account for potential differential responses of bound and unbound firms to contemporaneous macroeconomic conditions. Second, we conduct a placebo test using the two placebo events associated with general macroeconomic downturns: economic recession and financial crisis. If the disclosure-increasing effects of sovereign downgrades on bound firms are due to different sensitivity of firm fundamentals to macroeconomic conditions rather than asymmetric reductions in corporate ratings, then we should observe similar patterns using other episodes with adverse economic shocks. However, we find no significant differences in disclosure in response to economic recessions or the financial crisis. Third, we observe no significant difference in the sensitivity of firm performance — revenues or operating income — to macroeconomic factors including GDP growth, GDP per capita, and inflation, further alleviating the concern that the rating-disclosure nexus is caused by differential sensitivity of firm performance to changes in macroeconomic factors. Overall, our test results suggest that the differential responses of corporate information production around sovereign downgrade events is unlikely to be due to differential sensitivity of firm performance to macroeconomic conditions.

We next explore the heterogeneous treatment effects across firms and industries and evaluate whether the information-production-effects of sovereign downgrades vary in a theoretically predictable manner. We analyze how the treatment effects differ across firms by (1) the extent of external finance dependence, and (2) the opacity of information environment. These cross-sectional analyses help us draw sharper inferences on whether the changes in treated firms' disclosure following a sovereign downgrade are due to changes in these firms' rating and the cost of debt in the bond markets.

First, if a sovereign downgrade induces firms to disclose more information through affecting their credit ratings and the cost of debt, we should observe stronger treatment effects for firms that rely more heavily on capital markets for raising external funds. We measure industrial dependence on external financing using a similar approach in Rajan and Zingales (1998). In particular, *External Finance Dependence* (*EFD*) equals the difference between capital expenditures and internally generated cash flows divided by capital expenditures. Consistent with our conjecture, the treatment effects are more pronounced among firms belong to industries relying heavily on external finance, suggesting that sovereign downgrades enhance corporate voluntary disclosure by putting downward pressure on corporate rating and the cost of external finance.

Second, we evaluate whether the treatment effects are stronger for firms in a comparatively more opaque information environment. If treated firms respond to a sovereign downgrade event by stepping up disclosure in order to actively shape the information environment, we expect the responses to be larger among firms lack of other information intermediaries. Besides credit rating agencies, specialized analysts are regarded as another important supplier of public information for investors (e.g., Chen, Harford, and Lin 2015; Ellul and Panayides 2018). We therefore use the number of professional analysts covering a firm to gauge the extent of information asymmetries between the firm and investors. We discover that the firms respond more strongly to a sovereign downgrade when they are covered by a lower number of analysts. This finding is consistent with the notion that the corporate disclosure responds more actively as a consequence of credit downgrade when firms operate in a less transparent environment.

As an extension of the core analyses, we examine whether the increased voluntary disclosure induced by sovereign downgrades exerts a material impact on the subsequent cost of debt. The empirical results so far suggest that treated firms increase voluntary disclosure in

response to sovereign downgrades. Given that prior research has shown that information disclosure is linked to firms' cost of capital (e.g., Easley and O'Hara, 2004; Graham, Li, and Qiu, 2008; Tang 2009; Kisgen and Strahan 2010),[2] we expect that the enhanced disclosure affects the subsequent cost of debt over the years after a sovereign downgrade. Note that this exercise is not as well identified as our main analyses, since the decision of issuing guidance or not (conditional on being treated) is endogenous. Bearing these limitations in mind, we conduct the analyses to provide some suggestive evidence on whether voluntary information disclosure exerts a material impact on the cost of debt. To do this, we examine the dynamic treatment effects on the cost of debt among bound firms issuing at least one guidance in the treatment year ("Guider") and those that did not issue any guidance ("Non-guider"). We find that the cost of debt for guiders recovers back to the pre-shock level within three years, whereas non-guiders experience a sustained increasing cost of debt, suggesting that information disclosed by firms influences the pricing of corporate debt.

Our study is related to the literature on the role of corporate managers in shaping firms' information environment. Existing literature suggests that firms exploit their discretion over disclosure to reduce information asymmetry between insiders and outside investors (see Healy and Palepu, 2001; and Hirst et al., 2008 for a comprehensive review). Researchers also show that firms strategically disclose information for market timing purposes. For instance, Lang and Lundholm (2000) show that firms increase their disclosure activities before raising external capital. Brockman, Khurana, and Martin (2008) find that managers disclose more bad news before share repurchases, while disclose more good news afterwards. Our research suggests that corporate managers use voluntary disclosure as an important conduit to shape the

[2] Regarding the relation between corporate disclosure and access to capital markets, for example, Easley and O'Hara (2004) theoretically prove that by supplying more public information to the market, a firm can reduce the information asymmetry between informed and uninformed investors, and thus reduce the equilibrium cost of capital. Graham, Li, and Qiu (2008) show that corporate misreporting is associated with stricter loan contract terms.

information environment in response to an adverse shock to ratings induced by rating agencies' sovereign ceiling policies. This article also relates to the credit ratings literature. While researchers show that credit ratings affect financial policies and investment decisions (e.g., Kisgen 2006; Kisgen and Strahan 2010; Harford and Uysal 2014; Almeida et al. 2017), we discover that firms provide more informative guidance after a rating downgrade to maintain access to public debt markets.

The remainder of the paper proceeds as follows. Section 2 introduces the institutional background on the sovereign rating ceiling. Section 3 describes the data and variable. Section 4 discusses the empirical findings. Section 5 concludes.

2. Institutional Background on Sovereign Ceilings and Downgrades

Our empirical strategy exploits the variations in corporate ratings resulting from (a) the sovereign credit ceiling rule and (b) the sovereign downgrade events. The sovereign ceiling policies stipulate that firms' ratings remain below or equal to the sovereign rating of their country of domicile. This rule is a common practice among all three major credit rating agencies—Standard and Poor's, Moody's, and Fitch. Similar to prior studies (Adelino and Ferreira 2016; Almeida et al. 2017), we use an issuer's foreign currency long-term ratings, which are most likely to be bounded by its sovereign rating. We focus on the S&P's ratings history because S&P is often more active and leads other agencies in making rating revisions (e.g., Kaminsky and Schumkler 2002).[3]

The rationale of using the sovereign rating as an upper bound for corporate ratings is as follows. In rating issuers, agencies consider the issuer's ability and willingness in repaying their debt obligations. When an issue is denominated with foreign currency, rating agencies

[3] S&P tends to lead Moody's and Fitch in the timeliness of issuing credit rating changes. We thus use S&P long term issuer credit ratings to capture the effects of unanticipated credit rating change.

further consider the transfer and convertibility risk – the likelihood that the government in the country of domicile imposes sovereign exchange and capital controls over capital flow in and out of the country facing sovereign distress, so that issuers are restrained from converting local currency to foreign currency, and moving their foreign exchange offshore to repay foreign currency debt obligations (Moody's 2005).

The sovereign ceiling rule plays a determining role in corporates' foreign currency ratings, even though the recent rating methodology allows for exceptions. In particular, the rating of a firm can pierce the sovereign ceiling only if the issuer exhibits (a) superior financial stability and low default dependence relative to the sovereign, and (b) low sensitivity to the risk of domestic economic and financial distress (Standard & Poor's, 2013). Nevertheless, corporates with ratings that are above the sovereign rating are rare. Consistent with this view, Borensztein, Cowan, and Valenzuela (2013) show that the sovereign ratings indeed represent a strong upper bound for rating corporate issuers.

Figure 1 confirms that the vast majority of firms receive ratings at or below the sovereign. The figure plots the distribution of corporate ratings relative to their sovereign ratings. The x-axis denotes the relative corporate rating, the difference between corporate rating and sovereign credit rating. The y-axis denotes the number of observations in our sample for each particular relative rating notch in the year prior to a sovereign credit downgrade event. As shown, the vast majority of firms receive the same rating as or a rating lower than the sovereign and only a few firms are rated above the sovereign rating, indicating that the sovereign ceiling rules are in general binding.

We also verify that compared with corporate issuers whose pre-downgrade ratings were below the sovereign rating (i.e., non-bound firms, light blue in Figure 1), issuers were rated equal to or above the sovereign rating before the sovereign downgrade (i.e., bound firms, dark blue in Figure 1) are more likely to be downgraded as a consequence of the sovereign ceiling.

That is, a sovereign downgrade has a stronger ratings effects on bound firms than non-bound firms due to the sovereign ceiling rule. We discuss these validity test results in greater detail in Section 4. Intuitively, consider that Italy with an AA sovereign rating was downgraded to AA- in 2004, Italian firms with ratings of AA (and above) are much more likely to be downgraded than firms with ratings below AA prior to the sovereign downgrade. In similar spirit to prior studies (e.g., Adelino and Ferreira 2016; Almeida et al. 2017), our identification strategy exploits this asymmetric changes in corporate ratings induced by a sovereign downgrade, and assesses whether firms that are downgraded as a result of a sovereign downgrade change their voluntary information disclosure.

3. Data and Variable

3.1 Corporate Information Production

We retrieve forward-looking guidance issued by firms around the world from the IBES Guidance database. We start from all guidance records in the database while excluding observations regarded as pre-announcements (i.e., guidance issued after the forecast period end date). We use corporate forecasts on the five most commonly reported measures in the database, namely capital expenditure (CPX), earnings per share (EPS), sales (SAL), EBITDA (EBT), and net income (NET), and aggregate corporate guidance at the firm-year level. We focus on firms that have issued at least one guidance based on the IBES Guidance database and exclude firms without any guidance record, because we cannot distinguish whether these firms did not issue any guidance or are not covered by the database.

We construct two key measures of corporate information production via the issuance of forward-looking guidance. For each firm in a given year, *Frequency* equals the total number of forecasts issued by the firm in that year; *Horizon* equals the average number of days between the issuance date of a forecast and the corresponding forecast period end date. Higher values

of *Frequency* indicate more intensive issuance of corporate guidance. Higher values of *Horizon* indicate a greater time distance between the forecast issuance date and the end date of the fiscal period being forecasted, suggesting that firms produce information in a timelier manner. Table 2 presents the summary statistics of these two measures. As shown, the whole sample mean (median) value of the *Frequency* of corporate guidance issuance equals 4 (3) times per year. The mean (median) value of *Horizon* is 209 (193) days.

3.2 Treatment of the sovereign downgrade and ceiling

We obtain annual information on firm fundamentals and credit ratings from the Thomson Reuters Eikon database. Eikon provides global coverage of firm-level financial and accounting information, corporate credit ratings, along with market-based data.

We identify whether a firm is bounded by the sovereign ceiling using its S&P long-term foreign currency ratings. For each firm in a year, *Bound* is a dummy variable equal to one if the firm's credit rating is at or above the sovereign rating in a given year. *Sovereign Downgrade* is an indicator equal to one if a sovereign downgrade event occurred in the current fiscal year. The sovereign downgrade events are from Almeida et al. (2017). Table 1 lists all the sovereign downgrade events in which we have at least one bound firm with available information on financial items from Eikon. The number of bound firms equals 68 across 11 countries, which is in similar magnitude to that in Almeida et al. (2017).

Our analyses take into account a vector of firm characteristics including *Size, Leverage, Cash Ratio, Tobin's Q,* and *ROA. Size* equals the natural logarithm of the book value of total assets. *Leverage* equals the total amount of debt (sum of short-term debt, long-term debt with maturity longer than 1 year, and long-term debt with maturity within 1 year) divided by total assets. *Cash Ratio* is the ratio of cash and cash equivalents over total assets. *Tobin's Q* equals total assets net of book value of common stock and preferred stock, plus market capitalization,

divided by total assets. *ROA* equals net income divided by one-year-lagged total assets. We winsorize all financial variables at the 1% and 99% to mitigate the influence of outliers.

3.3 Matching procedure and sample

We combine IBES Guidance with Thomson Reuters Eikon using CUSIP, SEDOL, or company name, and compile a firm-year panel dataset containing firms in both Eikon and IBES Guidance over the period from 2001 – 2015. Our sample starts from 2001 because the global coverage of the IBES Guidance database becomes comprehensive in 2001. We exclude financial firms (Global Industry Classification Standard codes 4010-4030, 6010) and firm-year observations with negative or missing total assets. Thus, we start from 3,537 firms with available information on managerial guidance and financial and rating information.

To mitigate the concerns that the treated and control firms might have different (pretreatment) characteristics that confound our interpretation, we adopt a nearest neighbor matching approach based on Mahalanobis distance. Mahalanobis distance measures how far away two vectors of covariates are from each other, which is equivalent to the Euclidean distance of two vectors scaled to unit variance. We compute the distance metrics using *Size, Leverage, Cash Ratio,* and *ROA.* For each bound firm in the year of sovereign downgrade, we find the ten closest matched (and non-bound) firms from the same country and year, based on firm characteristics prior to a treatment.[4] As we conduct the matching procedure with replacement, it is possible that the same control firm matches multiple treated firms. Our matched sample contains 2,070 firm-year observations, among which 384 are bound-firm-year observations and 1,686 are non-bound-firm-year observations.[5] Although not reported, our key results obtain if each treated firm is matched with up to five closest firms.

[4] For treated firms experiencing multiple sovereign downgrade events, we find matching control firms using their first treatment year.

[5] In comparing our sample to that of Almeida et al. (2017), we note that the sample of Almeida et al. (2017) includes 73 bound firms in the year before a sovereign downgrade, whereas our sample includes 384 bound firm-

Table 2 reports the summary statistics of firm traits for the whole sample, and separately for firms that are treated during the sample period (the treated) and firms that are never treated during the sample period (the matched control sample). As shown, the basic firm characteristics between the treated and the matched control sample are comparable to each other. As shown, the sample mean value of *Size* is 23 and 22 in the treated and control group, respectively. The sample mean value of *Leverage* equals 0.3 in both the treated and control group. These comparison suggests that the treated firms are similar to the control firms in size, leverage, cash holding, Tobin's Q, and profitability. To further account for differences in firm characteristic, we control for these firm characteristics in later regressions.

4. Empirical Results

4.1 Validity Tests

Before presenting our core results, we first conduct two sets of analyses to validate our empirical strategy. Almeida et al. (2017) provide supporting evidence that (a) the probability of corporate downgrades in the month of a sovereign downgrade is significantly larger among bound firms than unbound firms, and (b) the cost of debt for bound firms rises dramatically subsequent to a sovereign downgrade compared to that of unbound firms. We now examine whether these key empirical regularities hold in our context.

4.1.1 Corporate Rating and Sovereign Downgrade

First, we examine whether bound firms (i.e., firms with credit ratings at or higher than the sovereign rating) have a disproportionately greater probability of being downgraded as a

years across all years during the sample period. Thus, their sample is cross-sectional, while we have a panel dataset. The number of bound firms in our sample is 55, which is slightly smaller than that of Almeida et al. (2017). This is because our analyses focus on the firms that have available information on the issuance of management guidance.

consequence of a sovereign downgrade. To test this view, we use a linear probability model (Angrist, 2001) and estimate the following specification.

$$Corporate\ Downgrade_{i,t} = \alpha_0 + \beta Bound_{i,t-1} \times Sovereign\ Downgrade_{i,c,t} + \gamma Bound_{i,t-1} + \delta Sovereign\ Downgrade_{i,c,t} + \lambda' X_{i,t-1} + Macro\ control + \alpha_i + \alpha_t + (\alpha_{c,t}) + \varepsilon_{i,t}, \quad (1)$$

where *i*, *c*, and *t* index firm, country, and year, respectively. The dependent variable, $Corporate\ Downgrade_{i,t}$, equals one if the credit rating of firm *i* is downgraded within year *t*. $Bound_{i,t-1}$ equals one if firm *i*'s rating is above or equal to the sovereign rating in year *t-1* and zero otherwise. $Sovereign\ Downgrade_{i,c,t}$ equals one if a sovereign downgrade event occurs in firm *i's* country of domicile *c* within the firm's fiscal year *t*. The key variable of interest is the interactive term, $Bound_{i,t-1} \times Sovereign\ Downgrade_{i,c,t}$. The coefficient of interest, β, captures the difference in downgrade probability between the bound and non-bound firms as a result of a sovereign downgrade. $X_{i,t-1}$ represents a vector of time-varying firm-specific traits, namely *Size, Leverage, Cash Ratio, Tobin's Q,* and *ROA*. *Macro control* includes a set of macroeconomic variables, namely *GDP Growth, GDP per capita,* and *CPI*, which help account for time-varying factors in a country's economic conditions, along with the interaction terms between each of the macroeconomic variables and the indicator of whether a firm's rating is bounded by the sovereign ceiling or not (*Bound*), which help account for the potential differential response to changes in macroeconomic conditions between bound and non-bound firms. Our results hold when including or excluding these macro controls. We also include a combination of year (α_t), and firm (α_i) or country (α_c) fixed effects. Including a full set of these fixed effects conditions out any common trends over time, and time-invariant factors across firms or countries, respectively. We also employ specifications in which we replace

country and year fixed effects with country-by-year fixed effects ($\alpha_{c,t}$) that condition out any time-varying factors across countries. We estimate the model using the ordinary least squares (OLS), with the standard errors clustered at the country-year level.

The estimation results reported in Table 3 suggest that firms treated by the sovereign downgrade (i.e., bound firms) are much more likely to be downgraded as a result of sovereign downgrades. As shown, the interaction term, *Bound* × *Sovereign Downgrade*, enters positively and significantly in all specifications, suggesting that bound firms face a disproportionately larger probability of downgrade than non-bound firms in a sovereign downgrade year. In contrast, the coefficients on the linear term, *Sovereign Downgrade*, are insignificant in all columns, suggesting that non-bound firms do not suffer a significant rating reduction in the year of a sovereign downgrade. These results hold to the inclusion of country and year fixed effects (columns (1) and (2)), country-by-year fixed effect (column (3)), and firm and year fixed effects (column (4)). The economic magnitude is not small, the coefficient estimates indicate that bound firms are on average 32 – 36% more likely suffer a downgraded in the year of a sovereign downgrade.

These results are unlikely to be a simply manifestation of differential responses to changes in macroeconomic conditions, as we separately control for time-varying country-specific macroeconomic indicators (*GDP Growth, GDP per capita,* and *CPI*), along with the interaction of each of these macroeconomic indicators with *Bound* to account for potential differential responses of bound and unbound firms to contemporaneous macroeconomic conditions. In addition, we do not observe any significant pre-treatment differences in the probability of corporate downgrade between bound and unbound firms, suggesting that the parallel trend requirements are fulfilled.[6]

[6] In Appendix Table A2 column (1), we repeat the analyses of Table 3 while replacing *Sovereign Downgrade* and *Bound* with the *Sovereign Downgrade* $^{-1}$ and *Bound* $^{-1}$. *Sovereign Downgrade* $^{-1}$ equals one in the year before a firm's operating country has a sovereign downgrade event and zero otherwise. *Bound* $^{-1}$ equals one for a firm in the year before the firm is a bound firm (rated at or above its sovereign rate at the beginning of year *t*) and zero

4.1.2 Cost of Debt and Sovereign Downgrade

We next conduct the second validity analysis. We examine and verify that treated firms experience a significant increase in the cost of debt financing via the bond markets. To measure corporates' cost of debt, we use bond yield, which is largely determined by corporate rating. For each bond issued by a firm, *Bond Yield* equals the logarithm of the yield-to-maturity of the bond. We obtain corporate bond data from Bloomberg. We start from all bonds issued by firms in the sample, and remove any bonds with option-like maturity types (callable, puttable, convertible, sinkable, death put, reverse convertible, etc.), insured bonds, and inflation-linked notes with floating rates. Our final bond-level sample includes 4,505 bond-year observations involving 742 unique bonds. We then use the following model specification to evaluate different changes in the cost of debt between treated and control firms around each sovereign downgrade.

$$Yield_{b,i,t} = \alpha_0 + \beta Bound_{i,t-1} \times Sovereign\ Downgrade_{i,c,t} + \gamma Bound_{i,t-1} + \delta Sovereign\ Downgrade_{i,c,t} + \phi'\theta_{b,t} + \lambda' X_{i,t-1} + Macro\ control + \alpha_i + \alpha_t + (\alpha_{c,t}) + \varepsilon_{b,i,t}, \quad (2)$$

where *b*, *i*, *c*, and *t* denote bond, issuing-firm, country, and year, respectively. The dependent variable, $Yield_{b,i,t}$, represents the log of yield-to-maturity of bond *j* issued by firm *i* in year *t*. $\theta_{b,t}$ denotes bond-specific characteristics that may affect yield-to-maturity: *Maturity* and *Coupon Rate*. Other variables have the same definition as in equation (1) above. The coefficient of interest, β, captures the difference in the changes of the cost of debt between treated and

otherwise. As shown, neither the linear terms nor the interaction term enters significantly, suggesting that bound firms do not experience a rating reduction in the year prior to the sovereign downgrade.

control firms in the year of treatment (i.e., sovereign downgrade). Similar to equation (1), we include (a) a set of macro controls (*GDP Growth, GDP per capita,* and *CPI*, and the interaction between each of the macroeconomic variables and *Bound*), (b) a vector of time-varying firm traits (*Size, Leverage, Cash Ratio, Tobin's Q*, and *ROA*), and (c) a combination of year (α_t) and firm (α_i) or country (α_c) fixed effects.

The results in Table 4 suggest that bond yield increases more for treated firms in the year of sovereign downgrades than untreated firms. As shown, *Bound* × *Sovereign Downgrade* enters positively and significantly at the 1% statistical level in all specifications, suggesting that bound firms suffer a disproportionately larger increase in the cost of debt financing in a sovereign downgrade year. The result holds when including country and year fixed effects (columns (1) and (2)), country-by-year fixed effect (column (3)), and firm and year fixed effects (column (4)). The results remain robust when controlling for macroeconomic variables (*GDP Growth, GDP per capita,* and *CPI*, and the interaction between each of the macroeconomic variables and *Bound*, a vector of time-varying bond characteristics and firm traits. The coefficient estimates imply that bond yields of bound firms raise by 30 – 40 % more than unbound firms in the year of a sovereign downgrade.[7]

Taken together, the validity test results in Table 3 and 4 are consistent with previous research (Almeida et al. 2017), suggesting that the treated firms (a) face a higher probability of downgrade and (b) suffer an increase in the cost of debt as a consequence of a sovereign downgrade. We next evaluate whether and how bound firms respond to the heightened cost of external financing resulting from sovereign downgrades.

[7] In Appendix Table A2 column (2), we repeat the analyses of Table 4 while replacing *Sovereign Downgrade* and *Bound* with replacing *Sovereign Downgrade* and *Bound* with the *Sovereign Downgrade* $^{-1}$ and *Bound* $^{-1}$. The interaction term enters insignificantly, suggesting that bound firms do not experience a significant increase in bond yield in the year prior to the sovereign downgrade. Thus, we do not observe any significant pre-treatment differences in the cost of debt, suggesting that the bond market does not anticipate or incorporate the effects of sovereign downgrades.

4.2 Core Analyses

4.2.1 Baseline Results

To estimate different responses between the bound and non-bound firms in a sovereign downgrade event year, we estimate the following model specification at the firm-year level.

$$Guidance_{i,t} = \alpha_0 + \beta Bound_{i,t-1} \times Sovereign\ Downgrade_{i,c,t} + \gamma Bound_{i,t-1} + \delta Sovereign\ Downgrade_{i,c,t} + \lambda' X_{i,t-1} + Macro\ control + \alpha_i + \alpha_t + (\alpha_{c,t}) + \varepsilon_{i,t}, \quad (3)$$

where *i*, *c*, and *t* index firm, country, and year, respectively. The dependent variable, $Guidance_{i,t}$, represents either *Frequency* or *Horizon* of forward-looking guidance issued by firm *i* in year *t*. Other variables are defined the same as in Equation (1). The coefficient of interest, β, measures the differential reactions in managerial information production between the bound and non-bound firms as a result of a sovereign downgrade. We estimate equation (3) using OLS, with the standard errors clustered at the country-year level.

Table 5 reports the baseline regression results. As shown, the coefficient estimates on *Bound* × *Sovereign Downgrade* are positive and statistically significant in all columns of Panel A, suggesting that compared to unbound firms (i.e., the control group), bound firms (i.e., the treated group) significantly increase the intensity of issuing corporate guidance in the year of a sovereign downgrade. More specifically, column (1) includes a full set of country and year fixed effects, thus conditioning out any time trends and unobservable time-invariant country factors. Column (2) includes addition firm-specific control variables (*Size, Leverage, Cash Ratio, Tobin's Q,* and *ROA*) and the coefficients of the interaction term remain statistically significant. Column (3) replaces the country and year fixed effects with country-by-year fixed effects to control for any unobservable time-variant country factors. Column (4) estimates a

model with firm and year fixed effects to account for any time trends and unobservable time-invariant firm traits. As can be seen, estimates on *Bound* × *Sovereign Downgrade* remain positive and significant. These economic magnitude are meaningful. The estimates from different specifications in Panel A imply that the number of corporate guidance issued by a firm increases by 1.2 – 1.9 times per year, equivalent to 35 – 52% of the sample mean value of *Frequency*.

Panel B of Table 5 repeats the analysis in Panel A, while replacing the dependent variable with the other measure of corporate information production, *Horizon*. Again, the coefficients of the interaction term, *Bound* × *Sovereign Downgrade* are positive and statistically significant, indicating that the bound firms respond to the sovereign downgrades by increasing the timeliness of forward-looking guidance. To illustrate the economic size, the estimates on *Bound* × *Sovereign Downgrade* in Panel B imply that the average gap between a guidance issuance date and the corresponding forecast period end date increases by 70 – 77 days more for bound firms, equivalent to about 30% of the sample mean value of *Horizon*.

To mitigate the concerns that our results simply reflect differential responses to contemporaneous changes in macroeconomic conditions between bound and unbound firms, we control for time-varying country-specific macroeconomic indicators (*GDP Growth*, *GDP per capita*, and *CPI*), as well as the interaction of each of these macroeconomic indicators with *Bound*. As shown, all our results continue to hold.

4.2.2 Dynamic Effects

We next examine the dynamic effects of sovereign downgrades on individual firms' information production. Besides testing whether changes in corporate voluntary disclosure patterns happen before the treatment, this approach allows us to observe whether the sovereign downgrades have a transitory or an enduring effect on corporate information production.

To examine the dynamic effects, we modify equation (3) while (a) replacing the *Sovereign Downgrade* dummy with a set of dummies indicating the number of years relative to the fiscal year in which a firm's operating country experiences a sovereign downgrade event (*Sovereign Downgrade* ^{k}, where k = -1, 0, 1, 2, and 3), and (b) replacing the *Bound* dummy with a set of dummies indicating the number of years relative to year when a corporate's rating is bounded by the sovereign ceiling (*Bound* ^{k}, where k = -1, 0, 1, 2, and 3). For example, *Sovereign Downgrade* $^{-1}$ equals one in the fiscal year *before* firm *i*'s operating country *c* has a sovereign downgrade and zero otherwise; *Sovereign Downgrade* ^{0} equals one in the fiscal year of firm *i* when its operating country *c* has a sovereign downgrade and zero otherwise; *Sovereign Downgrade* $^{+2}$ equals one in the second year after firm *i*'s operating country *c* has a sovereign downgrade and zero otherwise. Similarly, *Bound* $^{-1}$ equals one in the year before firm *i*'s credit rating is bounded by the sovereign ceiling and zero otherwise; *Bound* ^{0} equals one in the year if the credit rating of firm *i* is bounded by the sovereign ceiling and zero otherwise; and *Bound* $^{+2}$ equals one in second year after firm *i*'s rating is bounded by the sovereign ceiling and zero otherwise.

Table 6 shows that (a) neither the *Frequency* of forward-looking guidance nor the *Horizon* of corporate forecasts exhibits pre-treatment trends, and (b) the disclosure-enhancing effects of the treatment mainly occur in the year of the treatment. As shown in Panel A (*Frequency*) and Panel B (*Horizon*), *Bound* $^{-1}$ × *Sovereign Downgrade* $^{-1}$ enters insignificantly and with an economically small coefficient, suggesting that there is not a significant change in treated firms' information disclosure before a sovereign downgrade in their country of domicile. The coefficients on *Bound* ^{0} × *Sovereign Downgrade* ^{0} are positive and statistically significant, suggesting that the disclosure-enhancing effects of sovereign downgrades for the treated firms primarily take place in the year of a treatment. These results are consistent with the view that

bound firms immediately increase voluntary disclosure in response to adverse shocks on credit ratings and the cost of external finance in the credit markets.

Figure 2 plots the point estimates of the dynamic indicators (β_k) and the confidence intervals (dashed vertical lines) using the most stringent specification. As shown, the frequency of corporate guidance exhibits no significant difference between the treated and control firms in the year before the shock. In contrast, we observe a significant increase in the guidance frequency for the treated firms in the year of sovereign downgrade. The treatment effect remains significant, though becomes milder, in the second and third years after the sovereign downgrade.

4.2.3 Placebo Tests using Economic Recession and Financial Crisis

We next conduct a placebo test and examine the two events generally associated with macroeconomic downturns: economic recession and financial crisis. If the disclosure-increasing effects of sovereign downgrades on bound firms are driven by differential exposure to the adverse economic shocks as opposed to the reduction in corporate rating, our findings should hold when using other periods of economic downturns. However, if the disclosure-increasing effects of sovereign downgrades on bound firms are triggered by asymmetric reductions in corporate ratings, then other adverse shocks to macroeconomic conditions should have no effect on disclosure.

To test this conjecture, we employ a model specification similar to equation (3) while replacing the *Sovereign Downgrade* dummy with either *Economic Recession* or *Financial Crisis*. To determine recession periods, we retrieve the monthly composite economic indicators from OECD and define a month as in recession based on the turning point from the peak through the trough. *Economic Recession* is an indicator equal to one if country *c* has more than

six months in recession in year *t*. *Financial Crisis* is an indicator equal to one for all sample countries over the period from 2007 – 2009.

The placebo test results in Table 7 lend further support to the mechanism. As shown, the interaction term, *Bound* × *Economic Recession* (or *Bound* × *Financial Crisis*) enters insignificantly and with an economically small coefficients in all columns, suggesting that the general economic downturns in a county does not alter bound firms' disclosure in the county. Note that these results do not necessarily indicate that adverse shocks to macroeconomic conditions have no impact on corporate disclosure decision. Rather, these results suggest that adverse shocks to macroeconomic conditions would not exert a differential effect on disclosure between bound firms and unbound firms. The placebo test results further mitigate the concerns that the differential effects on corporate disclosure among bound vs. non-bound firms might reflect different exposure to other economic factors.

4.3 Cross-Sectional Heterogeneity

In this sub-section, we explore cross-sectional heterogeneity across industries and firms and evaluate whether the disclosure-effects of sovereign downgrades vary in a theoretically predictable manner. We analyze how the treatment effects differ across firms by (1) the extent of external finance dependence, and (2) the information environment shaped by analyst coverage. These cross-sectional analyses help us draw sharper inferences on whether the changes in treated firms' disclosure following a sovereign downgrade are due to changes in these firms' rating and the cost of debt in the bond markets.

4.3.1 Differentiate by External Finance Dependence

If a sovereign downgrade induces firms to voluntarily disclose more information through affecting their credit ratings and the cost of debt, we should observe stronger treatment effects for firms that rely more heavily on external capital markets for raising funds.

We measure firms' dependence on external financing using a similar approach in Rajan and Zingales (1998). We compute the extent to which firms in a specific industry depend on external finance using data from Compustat over the period from 1990 to 1999. According to Rajan and Zingales (1998), the financial markets in the U.S. are comparatively developed, thereby U.S. firms face the least frictions in accessing capital markets and the EFD indicators are more likely to reflect the demand for external financing due to technological reasons. In particular, *External Finance Dependence* (*EFD*) equals the difference between capital expenditures and internally generated cash flows divided by capital expenditures. The *EFD* is calculated at the two-digit SIC industry level.[8] Higher values of *EFD* indicate greater reliance on external finance to meet capital expenditure needs for technological reasons. *High EFD* is a dummy variable equal to one for industries with an EFD index higher than the sample median value and zero otherwise.

To evaluate the potential differential effects of sovereign downgrades across firms in industries with varying degrees of external finance dependence, we modify baseline regression, while allowing the treatment effects to vary across industries with high and low external finance dependence.

$$Guidance_{i,t} = \alpha_0 + \beta_1 Bound_{i,t-1} \times Sovereign\ Downgrade_{i,c,t} \times High\ EFD_j + \beta_2 Bound_{i,t-1} \times Sovereign\ Downgrade_{i,c,t} \times Low\ EFD_j + \gamma Bound_{i,t-1} + \delta Sovereign\ Downgrade_{i,c,t} + \lambda' X_{i,t-1} + Macro\ control + \alpha_t + \alpha_i + \varepsilon_{i,t}, \quad (4)$$

[8] We match the two-digit SIC code to the two-digit NAICS code, which is the industry classification code used in our primary sample from Thomson Reuters.

where *i*, *j*, *c*, and *t* index firm, industry, country, and year, respectively. $High\ EFD_j$ ($Low\ EFD_j$) is an indicator equal to one if firm *i* in industry *j* has an EFD index above (below) the sample median value, and zero otherwise. Other variables have the same definition as in equation (3). The coefficients, β_1 and β_2, capture the treatment effects among firms with high and low extent of external finance dependence, respectively.

The estimation results are presented in Table 8. The dependent variable is the intensity and forecasting horizon in column (1) and (2), respectively. As shown, the coefficient on *Bound* × *Sovereign Downgrade* × *High EFD* is positive and statistically significant in both columns, whereas the coefficient on *Bound* × *Sovereign Downgrade* × *Low EFD* is negative and insignificant. The difference between the two coefficients is significant at the 1% level (p=0.004). Thus, the treatment effects are more pronounced among firms in industries that rely heavily on external finance. This is consistent with the view that sovereign downgrades enhance corporate voluntary disclosure by putting downward pressure on corporate rating and the cost of external finance.

4.3.2 Differentiate by Analyst Coverage

We next evaluate whether the treatment effects are stronger for firms in an informationally more opaque environment. If treated firms respond to a sovereign downgrade event by stepping up disclosure in order to actively shape the information environment, we expect the responses to be larger among firms lack of other information intermediaries. Besides credit rating agencies, specialized analysts are regarded as another important supplier of public information for investors. We therefore use the number of professional analysts covering a firm to gauge the extent of information asymmetries between the firm and investors (e.g., Chen, Harford, and Lin, 2015). Analyst coverage data come from the IBES database. For each firm

in a given year, *Coverage* equals the average number of analysts that have issued a forecast on the firm over the previous three years.

To examine whether the effect of sovereign downgrades on disclosure is larger for firms in informationally more opaque environment, we employ a model similar to equation (4) while interacting *Bound* × *Sovereign Downgrade* with two dummies indicating whether the number of analysts covering the firm in the year prior to the treatment is above (*High Coverage*) or below (*Low Coverage*) the sample median value.

The estimation results reported in Table 9 suggest that the treatment effect is about three to five times larger when analyst coverage is low. Although both *Bound* × *Sovereign Downgrade* × *High Coverage* and *Bound* × *Sovereign Downgrade* × *Low Coverage* enter positively and statistically significantly in the regression of *Frequency* (column 1) and the regression of *Horizon* (column 2), the difference between the two coefficients on the triple interactive terms is significant at the 1% level (p=0.0013). These results suggest that the corporate managers respond more actively by disclosing more information as a consequence of credit downgrade when they have lower analyst coverage and operate in a less transparent environment.

4.4 The Effects of Disclosure on the Cost of Debt, Guider vs. Non-Guider

We now extend the core analyses by exploring whether the increased voluntary disclosure induced by sovereign downgrades exerts any material impact on the subsequent cost of debt. The empirical results so far suggest that treated firms increase voluntary disclosure in response to sovereign downgrades. If the resultant corporate guidance contains valuable information that helps the markets better assess the issuing firms, we expect that the enhanced disclosure has a real impact on the cost of debt in the years after a sovereign downgrade.

To test this conjecture, we conduct a heterogeneous test examining the differential treatment effects on the cost of debt between bound firms that issued at least one guidance in the sovereign downgrade event year ("Guider") and those that did not issue any guidance ("Non-guider"). To test this, we use the following dynamic difference-in-difference model specification, allowing the treatment effects to vary between guidance-issuing and non-issuing firms.

$$Yield_{b,i,t} = \sum_{k=0}^{3}(\beta_{1k} Bound_{i,t-1}^{k} \times Sovereign\ Downgrade_{i,c,t}^{k} \times Guider_{i,t}^{k} + \beta_{2k} Bound_{i,t-1}^{k} \times Sovereign\ Downgrade_{i,c,t}^{k} \times NonGuider_{i,t}^{k} + \gamma_k Bound_{i,t-1}^{k} + \delta_k Sovereign\ Downgrade_{i,c,t}^{k}) + \phi'\theta_{b,t} + \lambda' X_{i,t-1} + Macro\ control + \alpha_t + \alpha_i + \varepsilon_{b,i,t}, \quad (5)$$

where *b*, *i*, *c*, and *t* denote bond, issuing-firm, country, and year, respectively. The dependent variable, $Yield_{b,i,t}$, represents the log of yield-to-maturity of bond *j* issued by firm *i* in year *t*. $Guider_{i,t}$ equals one if firm *i* issues at least one management forecasts in the sovereign downgrade year and zero otherwise. $NonGuider_{i,t}$ equals one if firm *i* does not issue any management forecasts in the sovereign downgrade year and zero otherwise. Other variables have the same definition as in previous equations.

To capture the dynamic effects on the cost of debt between guiders and non-guiders, we include (a) a set of dummies indicating the number of years relative to the sovereign downgrade event year (*Sovereign Downgrade* ^{k}, where *k* = 0, 1, 2, or 3), (b) a set of dummies indicating the number of years relative to year when a corporate's rating is bounded by the sovereign ceiling (*Bound* ^{k}, where *k* = 0, 1, 2, or 3). To examine the heterogeneous effect of sovereign downgrades on the cost of debt between guiders and non-guiders, we interact *Bound* × *Sovereign Downgrade* ^{k} separately with the indicators of *Guider* and *Non-Guider*. If guiders and non-guiders experience different recovery patterns on the cost of debt in the aftermath of

a sovereign downgrade, we expect coefficients estimates between β_{1k} and β_{2k} to differ significantly. Table 10 presents the estimation results of equation (5).

Note that this exercise is not as well identified as our main analyses, since the decision of issuing guidance or not (conditional on being treated) is endogenous. Bearing these limitations in mind, we conduct the analyses to provide some suggestive evidence on whether voluntary information disclosure exerts a material impact on the cost of debt.

As shown, the guidance-issuers and non-issuers experienced different effects on the cost of debt over the three years following a sovereign downgrade. As shown, in the year of sovereign downgrade, both guiders and non-guiders face an increased cost of debt. The adverse effects on the cost of debt for guiders remain statistically significant until two year after the shock, whereas the adverse effects on the cost of debt for non-guiders stay significant throughout the three years after the shock. The difference in the cost of debt between issuers and non-issuers widens over time. In the first year after the shock, the cost-increasing effects of sovereign downgrades on non-issuers are about 2.5 times larger than those on issuers. In the third year after the shock, issuers' cost of debt reverses almost back to its pre-shock level, while non-issuers still face a 30% higher cost of debt. The F-test shows that the differences in the cost of debt between issuers and non-issuers are statistically significant over the period from *t* through *t*+3 at least at the 5% level. Thus, issuers experience a recovery of the cost of debt in the aftermath of a sovereign downgrade event, while non-issuers suffer a persistent heightened cost of debt.

4.5 Firm Fundamentals

As a final set of analyses, we assess whether firm fundamentals differ significantly between bound and unbound firms prior to a sovereign downgrade. There might be concerns that the effects on voluntary disclosure could be driven by the differential trends in firm

fundamentals and thus creditworthiness between bound and unbound firms, confounding our interpretation of the results. To mitigate this concern, we examine whether firm performance (measured by sales and operating profits) differ significantly between the two groups of firms in the year prior to the sovereign downgrade.

To test this, we use a model specification similar to equation (3) while (a) using firm performance measures (*Sales* or *EBIT*) as the dependent variable, and (b) replacing the *Sovereign Downgrade* and *Bound* dummy with *Sovereign Downgrade* $^{-1}$ and *Bound* $^{-1}$, respectively. Results reported in Appendix Table A3 exhibits no pre-treatment differences in firm performance between treated and control firms. As shown, *Bound* × *Sovereign Downgrade* $^{-1}$ enters insignificantly in all columns, suggesting that the asymmetric change in disclosure is attributable to plausibly exogenous reductions in credit ratings, rather than different changes in corporate fundamentals prior to the treatment.

We also examine whether the performance of bound firms react to changes in macroeconomic factors in a manner that is different from non-bound firms using the following equation.

$$Performance_{i,t} = \beta_1 Bound_{i,t-1} \times Macro_{c,t} + \beta_2 Bound_{i,t-1} + \beta_3 Macro_{c,t} + \beta_4 X_{i,t-1} + \alpha_t + \alpha_i + \varepsilon_{i,t}. \quad (6)$$

where *i*, *c*, and *t* index firm, country, and year, respectively. The dependent variable represents one of the firm performance measures, *Sales* (the log of total revenues) and *EBIT* (earnings before interest expense and income taxes divided by total assets) of firm *i* in year *t*. Other variables have the same definitions as those in our baseline model in equation (3). The variable of interest is the interaction term between the *Bound* dummy and each of the macroeconomic variables, namely *GDP Growth*, *GDP per capita*, and *CPI*. As shown in Appendix Table A4,

Bound × *GDP Growth*, *Bound* × *GDP per capita*, and *Bound* × *CPI*, enter insignificantly in all columns. This finding helps mitigate the concerns that the rating-disclosure nexus is driven by the differential sensitivity to changes in macroeconomic factors between bound and unbound firms.

5. Conclusion

In this study, we exploit plausibly exogenous variations in corporate credit ratings induced by sovereign rating downgrades events and sovereign ceiling policies, and assess the effect of changes in credit ratings on corporate information production. Given the sovereign ceiling policies and the resulting asymmetric impact of sovereign downgrades on corporate ratings, our analyses compare the responses of firms rated at or higher than the sovereign rating (i.e., bound firms) with those of firms rated below the sovereign rating (i.e., unbound firms).

We discover a significant increase in information production among bound firms, in the form of issuing forward-looking management guidance, following a sovereign downgrade. The effects are more pronounced among firms that rely more heavily on external finance and more opaque firms. Several robustness tests suggest that our findings are not driven by differential responses to contemporaneous changes in macroeconomic conditions, or differential pre-treatment trends in firm fundamentals. Consistent with previous research, we verify in our context that (a) bound firms are more likely to be downgraded as a result of a sovereign downgrade, and (b) bound firms subsequently experience a sharp increase in the cost of debt. Taken together, our empirical findings are consistent with the notion that when facing an exogenous reduction in credit ratings, firms step up voluntary disclosure to actively manage their information environment. Information produced by firms, in turn, affects the cost of debt in the bond markets.

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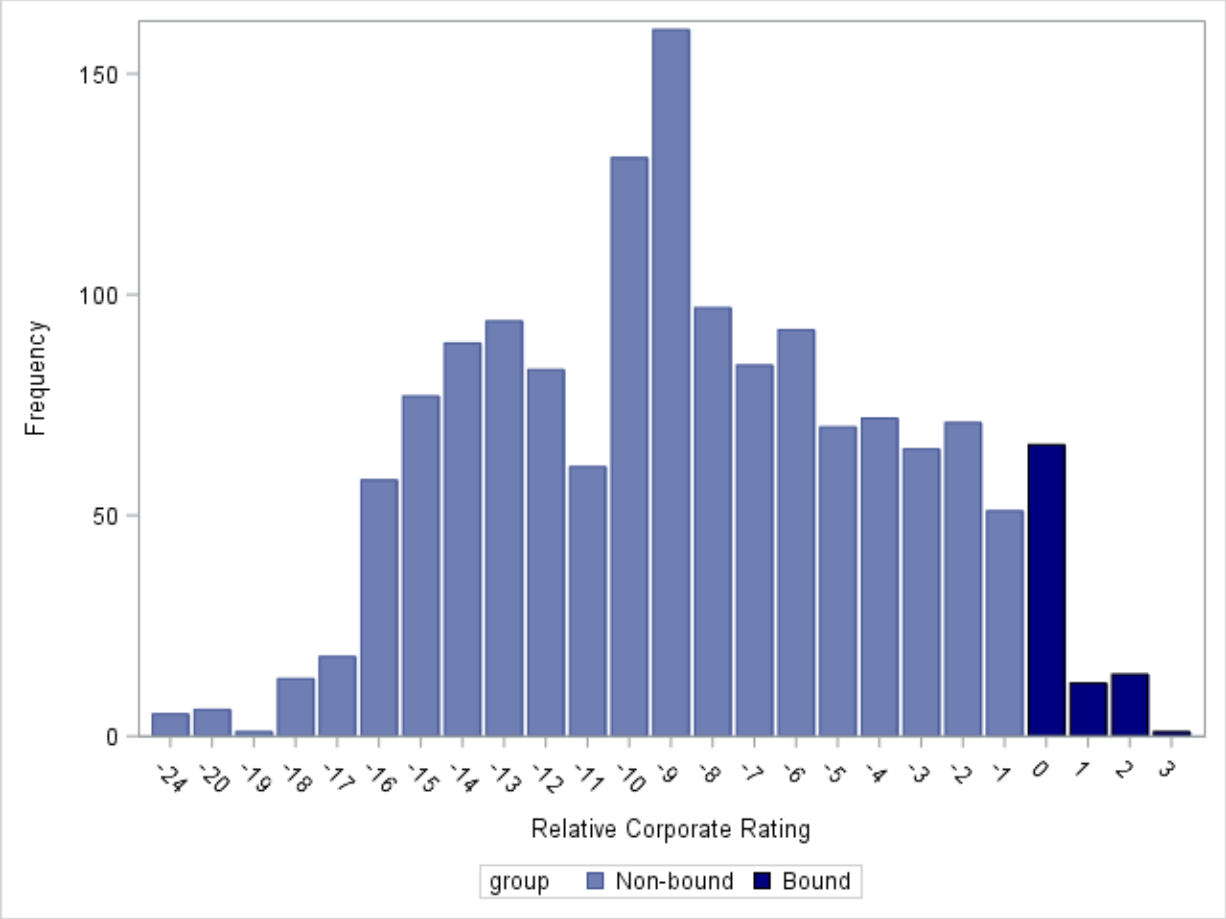

Figure 1. The Distribution of Differences between Corporate and Sovereign Ratings

This figure presents the distribution of corporate ratings relative to the sovereign rating (i.e. corporate rating – sovereign rating) for the firm's country of domicile in the year previous to a sovereign downgrade event. The horizontal-axis is the relative corporate rating. The vertical-axis is the number of firm-year observations. The treated group ("bound" firms), i.e. firms with the rating equal to or above the sovereign credit rating, is in dark blue, and other firm-year observations ("non-bound" firms) are in light blue.

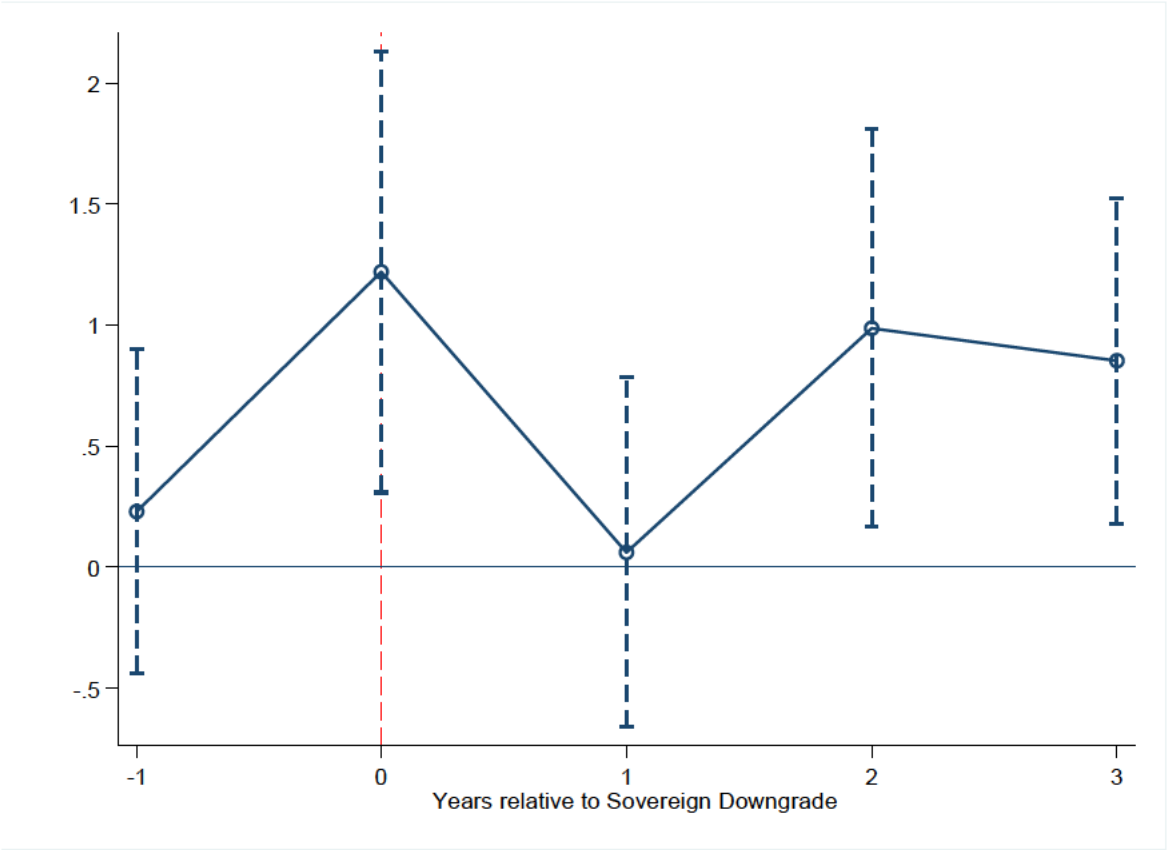

Figure 2. Dynamics Effects of the Sovereign Downgrade on Corporate Guidance

This figure shows the dynamic effect of sovereign downgrade events on the frequency of forward-looking guidance issued by bound (i.e. firms with the rating equal to or above the sovereign credit rating) and non-bound firms from one year before to three years after the event, [*t*-1, *t*+3]. In particular, the figure plots the point estimates of β_k and the 90% confidence intervals (dashed vertical lines) from the following model specification.

$$Guidance_{i,t} = \sum_{k=-1}^{k=3}(\beta_k \times Bound_{i,t-1}^{k} \times Sovereign\ Downgrade_{i,c,t}^{k} + \gamma_k \times Bound_{i,t-1}^{k} + \delta_k \times Sovereign\ Downgrade_{i,c,t}^{k}) + \lambda' X_{i,t-1} + Macro\ control + \alpha_i + \alpha_{c,t} + \varepsilon_{i,t}$$

where *i*, *c*, and *t* index firm, country, and year, respectively. $Sovereign\ Downgrade_{i,c,t}^{k}$ (where *k*= -1, 0, 1, 2, and 3) equals one for firm *i* in the k^{th} year relative to the fiscal year in which the firm's operating country *c* experiences a sovereign downgrade event, and zero otherwise. $Bound_{i,t-1}^{k}$ equals one for firm *i* in the k^{th} year relative to the year when the firm is bounded by the sovereign ceiling, and zero otherwise. $X_{i,t-1}$ represents a vector of time-varying firm-specific traits (*Size, Leverage, Cash Ratio, Tobin's Q,* and *ROA*). *Macro control* includes *GDP Growth*, *GDP per capita*, and *CPI*, interacted with *Bound*. α_i and $\alpha_{c,t}$ denote firm and country-by-year fixed effects. We estimate the model using OLS, with standard errors clustered at the country-year level.

Table 1. Sovereign Downgrade Events

This table presents the sovereign downgrade events occurred within the sample countries. The number of bound firms represents the number of firms with (a) a foreign currency long-term issuer rating above or equal to the sovereign credit rating in the year prior to the sovereign downgrade event, and (b) available financial information in Thomson Reuters Eikon.

Country	Sovereign Downgrade Date	Sovereign Rating		# Bound Firms
		Before	After	
Argentina	03/19/2001	BB-	SD	10
	08/11/2008	B+	B-	3
	10/30/2012	B	B-	1
	09/10/2013	B-	CCC+	2
Brazil	07/02/2002	BB-	B+	6
Hungary	11/23/2012	BB+	BB	1
Ireland	02/02/2011	A	BBB+	1
Italy	07/07/2004	AA	AA-	1
	10/19/2006	AA-	A+	2
	09/19/2011	A+	BBB+	2
	07/09/2013	BBB+	BBB	7
Japan	04/15/2002	AA	AA-	2
	01/27/2011	AA	AA-	14
Mexico	12/14/2009	BBB+	BBB	4
Philippines	01/17/2005	BB	BB-	4
Portugal	04/27/2010	A+	A-	1
	03/24/2011	A-	BBB-	2
Spain	01/13/2012	AA-	BBB-	2
US	08/05/2011	AAA	AA+	3
Total				68

Table 2. Summary Statistics

This table reports the mean and median values of the key variables of the whole sample, the treated and the control sample; standard deviations are reported in parentheses. The treated sample includes firms that have ever been treated by a sovereign downgrade event, and the control sample includes firms that have never been treated by a sovereign downgrade. Appendix Table A1 provides detailed variable definitions.

	Mean			Median		
	Whole Sample	Treated	Control	Whole Sample	Treated	Control
Frequency	4.069	3.565	4.208	3.000	3.000	3.000
	(3.615)	(2.979)	(3.760)			
Horizon	208.8	239.7	200.3	192.9	222.3	187.7
	(128.7)	(128.1)	(127.7)			
Size	23.502	23.699	23.438	23.490	23.600	23.474
	(1.386)	(1.450)	(1.360)			
Leverage	0.282	0.272	0.286	0.279	0.266	0.281
	(0.162)	(0.177)	(0.156)			
Cash Ratio	0.108	0.104	0.110	0.084	0.072	0.088
	(0.097)	(0.116)	(0.089)			
Tobin's Q	1.767	1.867	1.736	1.535	1.666	1.501
	(0.807)	(0.799)	(0.808)			
ROA	0.051	0.066	0.046	0.045	0.055	0.041
	(0.068)	(0.057)	(0.071)			

Table 3. Corporate Rating and Sovereign Downgrade

This table reports the differential effects on corporate downgrade probability between the bound and non-bound firms around a sovereign downgrade event. The dependent variable, *Corporate Downgrade*, equals one if the firm's credit rating is downgraded in a year and zero otherwise. *Bound* is a dummy variable equal to one if the firm has a credit rating above or equal to the sovereign credit rating in the previous year. *Sovereign Downgrade* is a dummy variable equal to one if there is a sovereign downgrade event occurs in the corresponding country of domicile. Macro controls include *GDP Growth, GDP per capita,* and CPI. Firm controls include one-year-lagged *Size, Leverage, Cash Ratio, Tobin's Q,* and *ROA*. Appendix Table A1 provides detailed variable definitions. Standard errors clustered at country-year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Corporate Downgrade			
VARIABLES	(1)	(2)	(3)	(4)
Bound × Sovereign Downgrade	**0.361*** **	**0.352*** **	**0.336*** **	**0.317*** **
	(0.0799)	(0.0822)	(0.0865)	(0.0850)
Bound	0.108	0.0936	0.0772	0.191*
	(0.0698)	(0.0731)	(0.0714)	(0.111)
Sovereign Downgrade	0.00257	-0.0160	-0.0701	-0.00869
	(0.0226)	(0.0251)	(0.0639)	(0.0253)
Bound × GDP Growth	-0.461***	-0.461***	-0.406**	-0.397**
	(0.174)	(0.173)	(0.186)	(0.176)
Bound × GDP per capita	-0.00243	-0.00210	-0.00157	-0.00487
	(0.00163)	(0.00171)	(0.00165)	(0.00296)
Bound × CPI	0.0101	0.00882	0.00988	0.00885
	(0.00715)	(0.00738)	(0.00873)	(0.00820)
GDP Growth	-0.0217	0.00241		-0.0124
	(0.0705)	(0.0798)		(0.0771)
GDP per capita	-0.00665	-0.00702		-0.00703
	(0.00430)	(0.00430)		(0.00454)
CPI	0.00929**	0.0101*		0.0119***
	(0.00415)	(0.00531)		(0.00441)
Size		0.0220***	0.0212***	0.0309
		(0.00714)	(0.00684)	(0.0275)
Leverage		0.0117	-0.00972	0.0901
		(0.0490)	(0.0498)	(0.0837)
Cash Ratio		0.0642	0.0667	-0.0373
		(0.0668)	(0.0674)	(0.105)
Tobin's Q		-0.00966	-0.0109	-0.00585
		(0.00789)	(0.00863)	(0.00933)
ROA		-0.413***	-0.452***	-0.153
		(0.132)	(0.136)	(0.139)
Year FE	YES	YES	NO	YES
Country FE	YES	YES	NO	NO
Country-Year FE	NO	NO	YES	NO
Firm FE	NO	NO	NO	YES
Observations	2,021	1,800	1,789	1,799
R-squared	0.116	0.127	0.186	0.212

Table 4. Cost of Debt and Sovereign Downgrade

This table presents the differential effects on the cost of debt between the bound and non-bound firms around a sovereign downgrade event. The analysis conducted at the bond-year level. The dependent variable, *Bond Yield*, is the logarithm of yield-to-maturity of corporate bond(s) issued by a firm. *Bound* is a dummy variable equal to one if the firm has a credit rating above or equal to the sovereign credit rating in the previous year. *Sovereign Downgrade* is a dummy variable equal to one if there is a sovereign downgrade event occurs in the corresponding country of domicile. Macro controls include *GDP Growth*, *GDP per capita*, and *CPI*. Firm controls include one-year-lagged *Size*, *Leverage*, *Cash Ratio, Tobin's Q,* and *ROA*. Bond controls include *Maturity* and *Coupon Rate*. Appendix Table A1 provides detailed variable definitions. Standard errors clustered by country-year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Bond Yield			
VARIABLES	(1)	(2)	(3)	(4)
Bound × Sovereign Downgrade	**0.296*** **	**0.360*** **	**0.365*** **	**0.403*** **
	(0.0816)	(0.0691)	(0.0753)	(0.0403)
Bound	-0.648**	-0.111	-0.112	-0.487
	(0.274)	(0.228)	(0.254)	(0.372)
Sovereign Downgrade	-0.117	-0.220***	-0.414***	-0.261***
	(0.0939)	(0.0643)	(0.0674)	(0.0580)
Macro Control	YES	YES	NO	YES
Bound × Macro Control	YES	YES	YES	YES
Bond Control	NO	YES	YES	YES
Firm Control	NO	YES	YES	YES
Year FE	YES	YES	NO	YES
Country FE	YES	YES	NO	NO
Country-Year FE	NO	NO	YES	NO
Firm FE	NO	NO	NO	YES
Observations	4,223	4,218	4,201	4,217
R-squared	0.340	0.692	0.719	0.764

Table 5. Corporate Information Production and Sovereign Downgrade, Baseline

This table presents the baseline results of the effects of sovereign downgrades on the intensity and horizon of corporate guidance. The dependent variable is the *Frequency* of corporate guidance issuance in Panel A, and the *Horizon* of forward-looking guidance issuance in Panel B. *Bound* is a dummy variable equal to one if the firm has a credit rating above or equal to the sovereign credit rating in the previous year. *Sovereign Downgrade* is a dummy variable equal to one if there is a sovereign downgrade event occurs in the corresponding country of domicile. Macro controls include *GDP Growth, GDP per capita,* and CPI. Firm controls include one-year-lagged *Size, Leverage, Cash Ratio, Tobin's Q,* and *ROA*. Appendix Table A1 provides detailed variable definitions. Standard errors clustered at the country-year level are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Panel A: Frequency			
VARIABLES	(1)	(2)	(3)	(4)
Bound × Sovereign Downgrade	**1.855*** **	**1.537*** **	**1.218** **	**1.232** **
	(0.676)	(0.532)	(0.581)	(0.485)
Bound	2.402***	2.208***	1.955***	2.301***
	(0.640)	(0.564)	(0.651)	(0.801)
Sovereign Downgrade	-0.0421	-0.00834	1.611	-0.00502
	(0.276)	(0.290)	(3.142)	(0.169)
Size		0.662***	0.749***	0.518
		(0.103)	(0.105)	(0.352)
Leverage		0.452	0.501	0.914
		(0.775)	(0.784)	(1.125)
Cash Ratio		-2.014***	-2.458***	-0.944
		(0.758)	(0.803)	(1.740)
Tobin's Q		0.517***	0.626***	0.655***
		(0.177)	(0.179)	(0.159)
ROA		-2.148	-1.717	-1.374
		(1.947)	(2.170)	(1.654)
Macro Control	YES	YES	NO	YES
Bound × Macro Control	YES	YES	YES	YES
Year FE	YES	YES	NO	YES
Country FE	YES	YES	NO	NO
Country-Year FE	NO	NO	YES	NO
Firm FE	NO	NO	NO	YES
Observations	1,062	1,016	1,003	1,006
R-squared	0.313	0.343	0.375	0.689

	Panel B: Horizon			
VARIABLES	(1)	(2)	(3)	(4)
Bound × Sovereign Downgrade	**70.28*** **	**76.58*** **	**76.77** **	**74.63*** **
	(25.88)	(27.33)	(29.26)	(26.80)
Bound	78.60**	83.58**	76.79*	133.3**
	(31.13)	(32.91)	(39.17)	(52.02)
Sovereign Downgrade	-11.98	-14.93	-61.27	-13.82
	(10.85)	(10.72)	(155.3)	(9.919)
Size		4.208	4.112	-29.91
		(4.236)	(4.284)	(22.48)
Leverage		13.12	11.96	-48.20
		(24.74)	(25.91)	(64.51)
Cash Ratio		-95.57***	-114.2***	-112.8*
		(36.28)	(37.31)	(58.81)
Tobin's Q		7.048	10.64**	11.13*
		(5.178)	(5.325)	(6.037)
ROA		-92.81	-91.07	-121.9
		(68.91)	(74.50)	(93.00)
Macro Control	YES	YES	NO	YES
Bound × Macro Control	YES	YES	YES	YES
Year FE	YES	YES	NO	YES
Country FE	YES	YES	NO	NO
Country-Year FE	NO	NO	YES	NO
Firm FE	NO	NO	NO	YES
Observations	1,062	1,016	1,003	1,006
R-squared	0.149	0.141	0.208	0.336

Table 6. Corporate Information Production and Sovereign Downgrade, Dynamic Effects

This table presents the dynamic effects of sovereign downgrades on the intensity and horizon of corporate guidance. The dependent variable is the *Frequency* of corporate guidance issuance in Panel A, and the *Horizon* of forward-looking guidance issuance in Panel B. The model specification is similar to Table 5, except that we replace *Bound* with a set of dummies indicating the number of years relative to year when a corporate's rating is bounded by the sovereign ceiling (*Bound* ^{k}, where k = -1, 0, 1, 2, or 3), and replace the *Sovereign Downgrade* dummy with a set of dummies indicating the number of years relative to the sovereign downgrade event year (*Sovereign Downgrade* ^{k}, where k = -1, 0, 1, 2, or 3). Macro controls include *GDP Growth, GDP per capita,* and CPI. Firm controls include one-year-lagged *Size, Leverage, Cash Ratio, Tobin's Q,* and *ROA*. Appendix Table A1 provides detailed variable definitions. Standard errors clustered at the country-year level are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Panel A: Frequency			
VARIABLES	(1)	(2)	(3)	(4)
Bound × Sovereign Downgrade $^{-1}$	0.134	-0.155	0.0810	-0.00919
	(0.353)	(0.300)	(0.354)	(0.426)
Bound × Sovereign Downgrade ^{0}	**1.627*** **	**1.537*** **	**1.403** **	**1.337** **
	(0.552)	(0.573)	(0.592)	(0.584)
Bound × Sovereign Downgrade $^{+1}$	-0.0442	-0.112	-0.0605	0.0340
	(0.366)	(0.401)	(0.472)	(0.393)
Bound × Sovereign Downgrade $^{+2}$	0.662	0.711	0.859	0.904*
	(0.620)	(0.653)	(0.644)	(0.519)
Bound × Sovereign Downgrade $^{+3}$	0.796*	0.823*	0.855**	0.926**
	(0.411)	(0.442)	(0.413)	(0.413)
Bound ^{k} and Sovereign Downgrade ^{k} (k = -1, 0, 1, 2, 3)	YES	YES	YES	YES
Macro Control	YES	YES	NO	YES
Bound × Macro Control	YES	YES	YES	YES
Firm Control	YES	YES	YES	YES
Year FE	YES	YES	NO	YES
Country FE	YES	YES	NO	NO
Country-Year FE	NO	NO	YES	NO
Firm FE	NO	NO	NO	YES
Observations	936	916	904	906
R-squared	0.334	0.367	0.411	0.727

	Panel B: Horizon			
VARIABLES	(1)	(2)	(3)	(4)
Bound × Sovereign Downgrade $^{-1}$	17.66	10.81	10.63	9.605
	(25.36)	(23.91)	(25.35)	(26.34)
Bound × Sovereign Downgrade ^{0}	**85.70*** **	**83.79*** **	**72.69** **	**87.08*** **
	(29.34)	(30.11)	(30.40)	(31.75)
Bound × Sovereign Downgrade $^{+1}$	15.97	16.11	-2.696	30.74
	(35.35)	(36.65)	(35.75)	(40.26)
Bound × Sovereign Downgrade $^{+2}$	7.444	3.476	10.81	15.99
	(28.25)	(29.45)	(30.77)	(29.85)
Bound × Sovereign Downgrade $^{+3}$	24.55	26.84	18.11	49.12
	(27.45)	(25.96)	(30.63)	(31.34)
Bound ^{k} and Sovereign Downgrade ^{k} (k = -1, 0, 1, 2, 3)	YES	YES	YES	YES
Macro Control	YES	YES	NO	YES
Bound × Macro Control	YES	YES	YES	YES
Firm Control	NO	YES	YES	YES
Year FE	YES	YES	NO	YES
Country FE	YES	YES	NO	NO
Country-Year FE	NO	NO	YES	NO
Firm FE	NO	NO	NO	YES
Observations	936	916	904	906
R-squared	0.112	0.121	0.205	0.343

Table 7. Placebo Test, Economic Recession and Financial Crisis

This table presents the placebo test results of the effects of placebo events (economic recessions and financial crisis) on the intensity and horizon of corporate guidance. The dependent variable is the *Frequency* of corporate guidance issuance, or the *Horizon* of forward-looking guidance issuance. *Bound* is a dummy variable equal to one if the firm has a credit rating above or equal to the sovereign credit rating in the previous year. *Placebo Event* represents either *Economic Recession* or *Financial Crisis*. *Economic Recession* is an indicator equal to one if a country has more than six months in recession (based on the composite economic indicators from OECD) in year *t*. *Financial Crisis* is an indicator equal to one for all countries over the period from 2007 – 2009. Macro controls include *GDP Growth, GDP per capita,* and CPI. Firm controls include one-year-lagged *Size, Leverage, Cash Ratio, Tobin's Q,* and *ROA.* Appendix Table A1 provides detailed variable definitions. Standard errors clustered by country-year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Recession		07-09 Financial Crisis	
VARIABLES	Frequency	Horizon	Frequency	Horizon
	(1)	(2)	(3)	(4)
Bound × Placebo Event	**0.00963**	**11.75**	**0.205**	**19.91**
	(0.412)	(24.79)	(0.274)	(26.68)
Linear Terms of Bound and Placebo Event	YES	YES	YES	YES
Macro Control	YES	YES	YES	YES
Bound × Macro Control	YES	YES	YES	YES
Firm Control	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Observations	1,006	1,006	1,006	1,006
R-squared	0.687	0.334	0.687	0.332

Table 8. Heterogeneous Effects, Differentiate by External Finance Dependence

The table presents the heterogeneous effects of sovereign downgrades on high vs. low EFD firms. EFD is calculated using a sample of COMPUSTAT US firms' universe from 1990 to 1999 as the fraction of capital expenditures not financed by internally generated cash flows. The dependent variable is the *Frequency* of corporate guidance issuance in column 1, and the *Horizon* of forward-looking guidance issuance in column 2. *Bound* is a dummy variable equal to one if the firm has a credit rating above or equal to the sovereign credit rating in the previous year. Macro control variables are *GDP Growth, GDP per capita,* and *CPI*. Firm control variables included one-year-lagged *Size, Leverage, Cash Ratio, Tobin's Q,* and *ROA*. Appendix Table A1 provides detailed variable definitions. Standard errors clustered by country-year are reported in parentheses. The *p*-values of testing the difference between the coefficients on *Bound* × *Sovereign Downgrade* × *High EFD* and *Bound* × *Sovereign Downgrade* × *Low EFD* are reported in square brackets. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	Frequency	Horizon
	(1)	(2)
(A) Bound × Sovereign Downgrade × High EFD	**1.327****	**71.52****
	(0.560)	(28.90)
(B) Bound × Sovereign Downgrade × Low EFD	**-0.590**	**-32.37**
	(0.402)	(28.24)
F-test for differences across (A) and (B) [p-value]	[0.0042]***	[0.0073]***
Linear Terms of Bound and Sovereign Downgrade	YES	YES
Macro Control	YES	YES
Bound × Macro Control	YES	YES
Firm Control	YES	YES
Year FE	YES	YES
Firm FE	YES	YES
Observations	962	962
R-squared	0.690	0.342

Table 9. Heterogeneous Effects, Differentiate by Analyst Coverage

The table presents the heterogeneous effects of sovereign downgrades on high vs. low analyst coverage firms. Analyst coverage is calculated as the total number of analysts issuing forecasts of the firm in the previous fiscal year. The dependent variable is the *Frequency* of corporate guidance issuance in column 1, and the *Horizon* of forward-looking guidance issuance in column 2. *Bound* is a dummy variable equal to one if the firm has a credit rating above or equal to the sovereign credit rating in the previous year. Macro control variables are *GDP Growth, GDP per capita,* and *CPI*. Firm control variables included one-year-lagged *Size, Leverage, Cash Ratio, Tobin's Q,* and *ROA*. Appendix Table A1 provides detailed variable definitions. Standard errors clustered by country-year are reported in parentheses. The *p*-values of testing the difference between the coefficients on *Bound* × *Sovereign Downgrade* × *High Coverage* and *Bound* × *Sovereign Downgrade* × *Low Coverage* are reported in square brackets. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	Frequency	Horizon
	(1)	(2)
(A) Bound × Sovereign Downgrade × High Coverage	**1.059****	**55.82****
	(0.497)	(23.85)
(B) Bound × Sovereign Downgrade × Low Coverage	**3.221*****	**289.9*****
	(0.575)	(56.89)
F-test for differences across (A) and (B) [p-value]	[0.0013]***	[0.0001]***
Linear Terms of Bound and Sovereign Downgrade	YES	YES
Macro Control	YES	YES
Bound × Macro Control	YES	YES
Firm Control	YES	YES
Year FE	YES	YES
Firm FE	YES	YES
Observations	1,006	1,006
R-squared	0.688	0.301

Table 10. Effects on the Cost of Debt, Guider vs. Non-Guider

This table presents the dynamic cost of debt difference-in-difference regression with heterogeneous treatment effect between issuers vs. non-issuers. A firm-year observation is marked as "issuer" if the firm issues at least one guidance within the year, and as "non-issuer" otherwise. The dependent variable, *Bond Yield*, is the logarithm of yield-to-maturity of corporate bond(s) issued by a firm. Other variables are defined the same as in previous tables. Macro controls include *GDP Growth*, *GDP per capita*, and *CPI*. Firm controls include one-year-lagged *Size, Leverage, Cash Ratio, Tobin's Q,* and *ROA*. Bond controls include *Maturity* and *Coupon Rate*. Appendix Table A1 provides detailed variable definitions. We include firm and year fixed effects. Standard errors clustered at the country-year level are reported in parentheses. The p-values of the F-test for the difference between guider and non-guider are reported in square brackets. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	Bond Yield
	(1)
(A1) Bound × Sovereign Downgrade × Issuer ^{0}	0.382***
	(0.109)
(A2) Bound × Sovereign Downgrade × Non-Issuer ^{0}	0.662***
	(0.0410)
(B1) Bound × Sovereign Downgrade × Issuer $^{+1}$	0.239**
	(0.0906)
(B2) Bound × Sovereign Downgrade × Non-Issuer $^{+1}$	0.608***
	(0.134)
(C1) Bound × Sovereign Downgrade × Issuer $^{+2}$	0.210***
	(0.0771)
(C2) Bound × Sovereign Downgrade × Non-Issuer $^{+2}$	0.435***
	(0.0838)
(D1) Bound × Sovereign Downgrade × Issuer $^{+3}$	0.0425
	(0.100)
(D2) Bound × Sovereign Downgrade × Non-Issuer $^{+3}$	0.297***
	(0.0686)
Bound ^{k} and Sovereign Downgrade ^{k} (k = -1, 0, 1, 2, 3)	YES
Macro Control and Bound × Macro Control	YES
Bond Control	YES
Firm Control	YES
Year FE	YES
Firm FE	YES
F-test for differences across (A1) and (A2) [p-value]	[0.0163]**
F-test for differences across (B1) and (B2) [p-value]	[0.0020]***
F-test for differences across (C1) and (C2) [p-value]	[0.0020]***
F-test for differences across (D1) and (D2) [p-value]	[0.0337]**
Observations	2,210
R-squared	0.820

Appendix

Table A1. Variable Definitions and Data Source

Variable	Definition	Data Source
Sovereign Downgrade and Treatment		
Bound	= 1 if the firm has a credit rating above or equal to the sovereign credit rating at the previous fiscal year end	Thomson Reuters Eikon
Sovereign Downgrade	=1 if a sovereign downgrade event takes place within the period	
Management Guidance		
Frequency	= total number of managerial guidance issued within a fiscal year	IBES Guidance Database
Horizon	= the average number of days between a managerial guidance and the corresponding forecast period end date	
Bond Characteristics		
Bond Yield	= the log of yield-to-maturity (in %) of a corporate bond	Bloomberg
Maturity	= number of months to maturity date	
Coupon Rate	= annual coupon rate (in %)	
Firm Characteristics		
Size	= the log of the book value of total assets	Thomson Reuters Eikon
Leverage	= total debt (sum of short-term debt, long-term debt with maturity longer than 1 year, and long-term debt with maturity within 1 year) / total assets	
Cash Ratio	= cash and cash equivalents / total assets	
Tobin's Q	= (total assets - book value of common stock and preferred stock + market capitalization) / total assets	
ROA	= net income / lagged total assets	
EFD (External Finance Dependence)	= Capital expenditures - Cash flow from operations) / Capital expenditures, where both capital expenditures and cash flow are summed over the [1990, 1999] window for each U.S. firm. We take the median value of the ratio among firms in the same industry (two-digit SIC) as the EFD	Compustat; Rajan and Zingales (1998)

	index for that particular industry.	
Analyst Coverage	= the average number of analysts that have issued at least one forecast on a firm over the previous three years	IBES
Macro Controls		
GDP Growth	= growth of GDP (in current US dollars, annual, not seasonally adjusted)	FRED Economic Data
GDP per capita	= GDP per capita (in 2010 constant 1,000 US dollars, annual, not seasonally adjusted)	
CPI	= Consumer Prices Index (in percent, annual, not seasonally adjusted)	

Table A2. Corporate Rating, Cost of Debt, and Sovereign Downgrade, Pre-Trends

This table reports the effects of a sovereign downgrade on (a) the probability of corporate downgrade, and (b) the cost of debt in the year prior to the sovereign downgrade. The dependent variable is *Corporate Downgrade*, and *Bond Yield* in columns 1 and 2, respectively. *Sovereign Downgrade* $^{-1}$ equals one for country *c* in the year before a sovereign downgrade. *Bound* $^{-1}$ equals one for a firm in the year before the firm's credit rating is bounded by the sovereign ceiling. Macro controls include *GDP Growth, GDP per capita,* and CPI. Firm controls include one-year-lagged *Size, Leverage, Cash Ratio, Tobin's Q,* and *ROA*. Appendix Table A1 provides detailed variable definitions. Standard errors clustered at the country-year level are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	Corporate Downgrade	Bond Yield
	(1)	(2)
Bound × Sovereign Downgrade $^{-1}$	-0.0211	0.0293
	(0.0818)	(0.0514)
Bound $^{-1}$	0.210	0.363
	(0.141)	(0.248)
Sovereign Downgrade $^{-1}$	0.0267	0.00425
	(0.0302)	(0.0635)
Macro Control	YES	YES
Bound $^{-1}$ × Macro Control	YES	YES
Firm Control	YES	YES
Year FE	YES	YES
Firm FE	YES	YES
Bond Control	NO	YES
Observations	1,662	3,469
R-squared	0.192	0.780

Table A3. Pre-treatment Firm Performance and Sovereign Downgrade

This table reports the effects of a sovereign downgrade on firm performance measures in the year prior to the sovereign downgrade. The dependent variable is the log of total revenues (*Sales*), or earnings before interest expense and taxes divided by total assets (*EBIT*). Other variables are defined the same as in the main text. Macro controls include one-year-lagged *GDP Growth, GDP per capita,* and CPI. Firm controls include one-year-lagged *Size, Leverage, Cash Ratio, Tobin's Q,* and *ROA*. Standard errors clustered at the country-year level are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	Sales	EBIT
	(1)	(2)
Bound × Sovereign Downgrade $^{-1}$	0.0565	0.00605
	(0.0934)	(0.00377)
Linear Terms of Bound and Sovereign Downgrade $^{-1}$	YES	YES
Macro Control	YES	YES
Bound $^{-1}$ × Macro Control	YES	YES
Firm Control	YES	YES
Year FE	YES	YES
Firm FE	YES	YES
Observations	2,547	3,277
R-squared	0.891	0.707

Table A4. Firm Performance and Macroeconomics Conditions

This table presents the regression results of the sensitivity of firm performance to macroeconomic conditions between bound and unbound firms. The dependent variable is the log of total revenues (*Sales*), or earnings before interest expense and income taxes divided by total assets (*EBIT*). Other variables are defined the same as in the main text. Firm controls include one-year-lagged *Size, Leverage, Cash Ratio, Tobin's Q,* and *ROA*. Standard errors clustered at country-year are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, 10% level, respectively.

VARIABLES	Sales			EBIT		
	(1)	(2)	(3)	(4)	(5)	(6)
Bound × GDP Growth	-0.243			0.00695		
	(0.547)			(0.0135)		
Bound × GDP per capita		0.0104			0.000044	
		(0.00642)			(0.00022)	
Bound × CPI			-0.0302			0.00034
			(0.0222)			(0.00065)
Bound	YES	YES	YES	YES	YES	YES
GDP Growth	YES			YES		
GDP per capita		YES			YES	
CPI			YES			YES
Firm Control	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Observations	2,894	2,894	2,766	3,723	3,723	3,558
R-squared	0.882	0.881	0.879	0.683	0.682	0.692