

Credit Rating and Corporate Disclosure: Evidence from Sovereign Credit Downgrades

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Abstract

Using sovereign credit ceiling rule as a quasi-natural experiment, we find the effect of credit rating change on corporate disclosure. Specifically, we find evidence of market frictions induced by the sovereign credit ceiling rule, and that affected firms face a higher cost of debt post-downgrade. In response, affected firms increase the frequency and the timeliness of voluntary disclosure. The effect is more profound when affected firms are more external finance dependent, and are covered by fewer financial analysts. Besides, firms that issue voluntary disclosure after credit rating shock experienced quick recovery of their cost of debt to pre-shock level. On the country, those firms which do not issue voluntary disclosure suffer from persisting higher cost of debt in the coming years. Our findings have broad implications for voluntary disclosure literature: firms actively contribute to the information environment when the credit ratings deviate from firm fundamentals and capital market fails to recognize the nature of the credit downgrades, and voluntary disclosure contains information relevant to the pricing of corporate debt.

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1. Introduction

Credit rating agencies (CRAs) serve as an important contributor to the information environment facing the firm. Credit ratings have significant impact on corporate decisions, because of relevant information it contains on the creditworthiness of the firm that have pricing implications to capital market investors (Kliger and Sarig 2000; Tang 2009; Kisgen and Strahan 2010), as well as the role it serves as a reference for financial institution regulations (Kisgen 2006). Previous literature shows that the cost of debt consequence of credit rating affects firm's leverage (Kisgen 2006, 2009), corporate financing choices (Hovakimian et al. 2009), and investment decisions (Almeida et al. 2017). While these studies hold the information environment facing the firm as exogenous, the firms might also affect the information environment by adjusting the disclosure it supplies to the market. In this paper, by exploiting an exogenous shock to the informational role of the credit rating where certain credit rating deviates more from the firm's fundamental, we study how the affected firm actively engages in shaping the information environment and improve market's understanding of the firm's fundamental.

The quasi-natural experiment used in our paper is sovereign credit ceiling rule, a general principle of not rating a firm higher than the sovereign credit rating at the firm's country of domicile, due to the reason that the firm's capacity to fulfill its foreign currency debt obligation is subject to the exchange and capital control risk when the sovereign debt defaults. Therefore, when there is a sovereign downgrade event, the corresponding corporate ratings for those that are originally rated equal or above the sovereign rating level (thereinafter the "Bound" firm) would be downgraded accordingly to fit the new sovereign credit ceiling, while the credit ratings of firms that are originally rated below (thereinafter the "Non-Bound" firms) would be less likely to be affected by the sovereign downgrade. This sovereign credit ceiling rule is strictly binding by all

three major credit rating agencies before 2001. Although recently the credit rating agencies are relaxing the rules by allowing exceptional cases of firms with great financial stability and resilience to the macroeconomic fluctuations to “pierce the ceiling”, those cases are still rare.

We argue that with the existence of the sovereign credit ceiling rule, in the aftermath of the sovereign downgrade event, the bound firms face a proportionally larger probability of downgrade, as compared with the non-bound firms, the difference of which is mainly due to the mechanical adjustment instead of firm fundamentals. It thus results in the bound firms’ credit ratings to deviate downward more from their true creditworthiness than the non-bound firms, which qualifies as an exogenous shock to corporate credit rating with bound firms as treated group and non-bound firms as control group. Even though the sovereign downgrade events precede likely worsening domestic macroeconomic disruptions which might affect both the bound firms and the non-bound firms, the asymmetric downgrade probability that cannot be explained away by firm fundamental differences would ensure our identification strategy free of endogeneity.

Previous studies have shown that the credit rating is a significant determinant for the firm’s access to financial market (Tang 2009). Indeed, we find that the corporate downgrades associated with sovereign credit downgrade events have significant impact on bound firms’s access to financial market compared with the non-bound firms. In particular, the bound firms face a larger increase in cost of debt than the non-bound firms at sovereign downgrade year, which is both statistically and economically significant.

In the next step, we examine the impact of sovereign credit downgrades on the voluntary disclosure decision of the bound firms. Specifically, we look at both the frequency and the horizon of managerial guidance issuance. The frequency measures the intensity of voluntary disclosure while the horizon measures how timely the guidance is issued in providing forecast about future

firm performances. By conducting difference-in-difference regression to examine the different change of voluntary disclosure level between the bound firms and the non-bound firms around sovereign downgrade events, we find that the bound firms increase voluntary disclosure frequency 34.55% more and horizon 31.13% more than the non-bound firms at the sovereign downgrade year, both of which are economically and statistically significant. Extending into dynamic regression, we find that the surge in frequency and horizon is only significant on the sovereign downgrade year, suggesting the increase in voluntary disclosure is a transitory response to the credit rating change. The results suggest that firms respond to a more adverse access to financial market induced by credit rating downgrade by both increasing the intensity and the timeliness of voluntary disclosure at the year of shock.

Two cross-sectional tests further confirm the story. First, we follow Rajan and Zingales (1998) to calculate the External Finance Dependence index (EFD) and estimate the difference-in-difference interaction term separately for high vs. low EFD bound firms. We find that the differential increase in voluntary disclosure is only significant for the high EFD group, and the difference in magnitude is significant, suggesting bound firms' deliberate efforts in supplying more voluntary disclosure are associated with the motive to rectify their impaired access to financial market.

Second, we use pre-shock analyst coverage to partition bound firms into high vs. low analyst coverage group, and estimate difference-in-difference interaction term separately, we find that the differential increase in voluntary disclosure is significantly larger for low coverage bound firms. Consistent with Balakrishnan et al. (2014) that analyst coverage and managerial voluntary disclosure are substitutive, this result suggests that the bound firms respond more profoundly in

voluntary disclosure when the financial analysts' role in resolving the credit rating misinformation is more limited.

Though the results seem to suggest that bound firms increase voluntary disclosure in order to remedy their increasing cost of debt, it is equally likely that the voluntary disclosure decisions and the changes in cost of debt coincide with other contemporaneous changes around such shocks. For example, Almeida et al. (2017) shows that bound firms substitute debt financing with equity financing at sovereign downgrade year. Thus it is possible that the bound firms increase voluntary disclosure with the aim to cater to their equity shareholders instead of remedying their access to debt capital market. To establish a link between voluntary disclosure and corporate cost of debt, we next conduct a placebo test. Specifically, we show that bound firms that do issue voluntary disclosure at sovereign downgrade year face a quick recovery of cost of debt back to their pre-shock level, while bound firms that don't issue face a sustained high cost of debt that persist into the third year after shock. While we don't intend to rule out the possibility that the voluntary disclosure increase is also intended to reduce cost of equity, this result provides a confirmative note that the voluntary disclosure indeed contains information relevant to the pricing of corporate debt.

One key assumption underlying our identification strategy is that the asymmetric corporate credit rating downgrade probability is unrelated to the firm fundamentals. Two potential concern might arise regarding the validity of the identification strategy. The first potential concern is that the different downgrade probability is caused by contemporaneous worsening firm fundamentals and thus it doesn't qualify as an exogenous shock. To overcome this concern, we conduct a difference-in-difference regression of Sales, EBIT, EBITDA and ROA in the year prior to sovereign downgrade events, and find that none of them are significantly different between the

bound firms and the non-bound firms, suggesting the asymmetric credit downgrade probability due to sovereign credit rating channel is indeed mechanical.

Another potential concern is that even though the pre-shock fundamentals of bound firms and the non-bound firms are similar, however, if the bound firms are more sensitive to the domestic macroeconomic factors, and when the sovereign credit downgrade foreshadows worsening domestic macroeconomic condition and ensuing financial market instability, the bound firms would have a more profound change of fundamental, and thus more profound response of voluntary disclosure than the non-bound firms after the sovereign downgrade events, even in the absence of the claimed credit rating change. While our baseline regressions include macroeconomic variables as well as their interaction terms with the bound dummy to control for any change of voluntary disclosure driven by the variations of macroeconomic factors, we further conduct two validity tests to alleviate this concern.

First, we conduct two placebo tests using macroeconomic events which are not related to the asymmetric change of credit rating between the bound firms and the non-bound firms. If the differential change in the disclosure level is due to the differential sensitivity to macroeconomic conditions, similar pattern that is evident in the sovereign credit rating events should also be observed in these contexts. Using recession and 2007-2009 financial crisis as the placebo events, neither of these tests shows a significant differential change of voluntary disclosure between the bound firms and the non-bound firms.

Second, as a more direct test of the firm's exposure to macroeconomics, we regress firm fundamentals on macroeconomic variables such as GDP Growth, GDP per capita and inflation, estimating the beta separately for bound firms and non-bound firms. None of the results shows that the bound firms are more sensitive to those macroeconomic variables. Taken all, the validity test

results alleviate the concern that the differential change of voluntary disclosure around sovereign downgrade events is due to differential sensitivity to macroeconomic conditions.

Our study contributes to the existing literature in three aspects. First, this study points to the consequences of the institutional friction induced by sovereign credit ceiling rules on capital markets and private sector. As credit ratings are increasingly drawn upon as a reference for regulators and investors (Becker and Milbourn 2011), it could be costly and welfare destroying if the credit rating agencies are not able to issue credit ratings that truthfully reflect the nature of the firm's fundamental. This paper suggests that sovereign credit downgrades could cause market frictions in determining bound firms' access to capital even in the absence of any fundamental change.

Second, this paper contributes to the credit rating literature. Previous studies show that credit rating provides non-redundant information for the market (Kliger and Sarig 2000; Jorion et al. 2005) and affect firm's cost of capital (Tang 2009; Kisgen and Strahan 2010). Besides, it also has significant implications for corporate decisions. For example, the firm conditions its capital structure decision on the credit rating status (Kisgen 2006), and its investment is also affected by the credit rating it obtains (Almeida et al. 2017). This study contributes to this literature by providing impact of credit rating on corporate voluntary disclosure decision.

Finally, this study contributes to the literature on the effect of voluntary disclosure on firms' capital market access. Prior studies establish links between voluntary disclosure and cost of equity financing. Leuz and Verrecchia (2000) shows that increased disclosure reduces the information asymmetry component of cost of equity. Similarly, Easley and O'hara (2004) shows that the supplying of public information reduces adverse selection and thus firms could influence their cost of equity by alternating their disclosure level. Besides, Balakrishnan et al. (2014) identifies the

effect of voluntary disclosure on increasing stock liquidity using an exogenous shock to analyst coverage. This study shows that besides the impact on equity financing cost, the voluntary disclosure is also relevant for the valuation of corporate debt.

In a contemporaneous paper, Basu, Naughton and Wang (2018) arrives at a similar conclusion using sovereign downgrade events as one of the exogenous shocks to corporate credit ratings. Our paper differs by providing extensive evidence on actual change in the cost of debt to pin point the concrete channel through which credit rating affects voluntary disclosure, and most importantly, by tracing the different dynamics of cost of debt in the aftermath of the sovereign downgrade event shocks between the disclosure issuers and non-issuers, we were able to establish a reverse effect of voluntary disclosure on reducing cost of debt. Besides, while Basu et al. (2018) studies the likelihood of voluntary disclosure and frequency, our study enriches the dimension by looking at both the frequency and the horizon of voluntary disclosure. Taken together, our results not only provide confirmative evidence with broader sets of voluntary disclosure measures, but also shed more light on the inter-determination between the managerial voluntary disclosure and the debt capital market.

2. Methodology and Data

2.1. Sovereign Credit Ceiling Institutional Background

This paper exploits a quasi-natural experiment that is a common practice by all three major credit rating agencies – Standard and Poor’s, Moody’s and Fitch, namely sovereign credit ceiling rule. It refers to the general rule of not granting a corporate foreign currency credit rating above the sovereign credit rating of the country of domicile.

What is the rationale behind this rule? According to the credit rating agencies, one crucial factor they consider in evaluating the corporate credit risk is “Transfer and Convertibility risk” (T&C risk) that points to two risks a firm is exposed to in meeting its foreign currency debt obligations. Convertibility risk refers to the risk that the firm might not be able to convert the local currency to foreign currency, while transfer risk refers to the risk that a firm might not be able to move its foreign exchange offshore to pay its debt on time, given the imposition of sovereign exchange and capital controls should the sovereign debt defaults (Moody’s 2005). Sovereign credit ceiling is a strictly binding rule until 2001. Recently the credit rating agencies are re-evaluating and revising their methodology and allowing certain cases of “piercing the ceiling”, given that the firm could show superior financial stability to a sovereign default event and local macroeconomic disruptions and pass certain sovereign default scenario stress test. According to Standard and Poor’s guidance (Standard & Poor’s, 2013), in the exceptional cases that the firm passes the stress test, it would be granted two or four notches above the sovereign credit rating, depending on the evaluated corporate exposure to sovereign risk by the agency. However, in general, such exceptional cases are rare, and sovereign credit ceiling still plays a generally deterministic role in corporate foreign currency credit rating.

Figure 1 plots the distribution of relative corporate rating with respect to the sovereign credit rating. The x-axis denotes the relative corporate rating that are calculated as corporate rating minus sovereign credit rating. The y-axis denotes the number of observations for the particular relative credit rating notch at the year prior to the sovereign credit downgrades. The bound firms are colored in red while the non-bound firms are colored in blue. Obviously, those bound firms rated equal to the sovereign credit rating (i.e. with relative credit rating of zero) overwhelms the

entire population of bound firms, leaving very few firms rated above the sovereign credit rating, indicating that the sovereign credit ceiling rules are in general binding.

It is noteworthy that a sovereign credit crisis is also likely to precede a domestic economic and financial disruption, which further aggravates the difficulty to meet the debt obligations by private sector. Thus, in certain severe sovereign default occasions, the credit rating of all firms of residence would inevitably be affected downward relatively. However, our identification strategy is not violated as long as the difference of the downgrade probability is maintained between the bound firm and the non-bound firm.

2.2. Identification Strategy

In this section, we present the formal validity test of sovereign credit downgrades serving as a valid exogenous shock to corporate credit rating. The test results prove that firms with a corporate rating equal to or above the sovereign credit rating prior to the shock are subject to a larger probability of foreign currency credit rating downgrade, compared with firms that are ex ante rated below the sovereign credit rating ceiling pre-shock.

Specifically, we run a linear probability model to test the asymmetric downgrade probability between the bound firms and the non-bound firms around the sovereign downgrade events:

$$\begin{aligned}
 & \textit{Corporate Downgrade Dummy}_{it} \\
 &= \beta_1 \textit{Bound}_{it} + \beta_2 \textit{Sovereign Downgrade}_{it} + \beta_3 \textit{Bound}_{it} \\
 & \times \textit{Sovereign Downgrade}_{it} + \beta_4 \textit{Bound}_{it} \times \textit{Macro}_{ct} + \beta_5 \textit{B}_{i,t-1} \\
 & + \beta_6 \textit{X}_{i,t-1} + \textit{Fixed Effects} + \varepsilon_{it}
 \end{aligned} \tag{1}$$

Table 3 presents the regression result. We aggregate the corporate downgrade events into firm-year, with dependent variable *Corporate Downgrade* equal to one if there are at least one corporate downgrade events in the given year. We include the macro control variables (*GDP Growth*, *GDP per Capita*, and *CPI*) as well as their interaction terms with *Bound* dummy to capture any corporate downgrade that are caused by the different sensitivity to macroeconomic conditions between the bound firms and the non-bound firms. We also add firm lagged control variables including *Size*, *Leverage*, *Cash Ratio*, *Tobin's Q*, and *ROA*. We add country and year fixed effects for column (1) and (2), country-quarter fixed effect for column (3) and firm and year fixed effects for column (4). All of the results yield a significant positive coefficient of $Bound \times Sovereign Downgrade$, suggesting the bound firms face a disproportionately larger probability of downgrade than non-bound firms during sovereign downgrade event years. Translating into probability, the bound firms have 31.7% to 36.1% higher probability of downgrade at sovereign downgrade year compared with non-bound firms. The *Sovereign Downgrade* coefficients for column (1), (2) and (4) are all insignificant, suggesting that the non-bound firms don't experience a significant downgrade at the sovereign downgrade year. In Appendix Table A1, column (1) presents the pre-trend test of corporate downgrade probability difference-in-difference regression using the most restrictive regression specification in Column (4). The insignificant interaction term suggests there is no pre-trend prior to the shock, validating the use of difference-in-difference regression.

To fully validate the exogenous nature of sovereign credit downgrades, we also need to prove that the asymmetric downgrade probability is not related to any firm fundamentals. In Section 3.6, we further present validity test to address any potential concern in this regard.

2.3. Sample and variable Construction

A. Data Source and Sample Construction

We use the sample from Thomson Reuters Eikon fundamental database to construct our firm-year panel. We also obtain corporate credit rating information from Thomson Reuters database. Voluntary disclosure data is obtained from IBES Guidance database, and matched to Thomson Reuters firms via CUSIP (for US firms) or SEDOL (for international firms). The analyst forecast information is obtained from IBES database, and matched to Thomson Reuters universe in a similar manner as IBES Guidance database. Our sample spans from 2001 to 2016, for the sake of a better coverage and data quality at later years of the IBES Guidance database. We first exclude financial firms (GICS industry group in 4010-4030, 6010) because those firms have business in nature different from other firms in the sample in terms of financing, disclosure and investment. We further screen any firm-year observation with negative or missing total assets.

B. Key Variable Definition

In this study, we use S&P long term issuer credit rating as the source for both corporate and sovereign credit rating. Alsakka et al. (2013) studies the downgrade events by European banks during the crisis period, and finds that S&P tend to lead Moody's and Fitch in the timeliness of issuing credit rating changes, while the credit rating by all three of them contains very similar information, which justifies our use of the S&P rating to capture the most unanticipated effects of credit rating change. The key variable, *Bound*, is defined using S&P long-term issuer credit rating with foreign currency scope. we use foreign currency scope because it is in line with the rationale of sovereign credit ceiling – a firm's ability to carry out its debt obligations that is mainly impacted by sovereign credit downgrade is reflected in its foreign currency debt. In particular, we define the firm-year with dummy variable *Bound* equaling to one when the corporate credit rating is equal or above the sovereign credit rating at previous fiscal year end date. We don't use the ex-post

realization of corporate downgrade result to define *Bound* variables since whether the firm is actually downgraded is endogenously affected with firm fundamentals. We use a similar sovereign downgrade sample as in Almeida et al. (2017) with downgrade events in the period of 2001-2016, and keep the events only when we can find at least one bound firms. The dummy variable *Sovereign Downgrade* takes the value of one if there is a sovereign downgrade event happening in the current fiscal year. Table 1 presents the whole list of sovereign downgrade events used in this paper. In total we have 68 observations of bound firms during sovereign downgrade years, which is slightly smaller compared with the sample Almeida et al. (2017).

C. Measure of Voluntary Disclosure

To construct measures on managerial voluntary disclosure, We obtain data from IBES Guidance database and exclude all observations pertaining to be pre-announcement (managerial earnings guidance issued after forecasting period end date), and aggregate guidances into firm-year measure based on top 5 most commonly reported measures in the IBES Guidance database, which include capital expenditure (CPX), earnings per share (EPS), sales (SAL), EBITDA (EBT), and net income (NET). We set as missing observation for firms that are never covered by IBES Guidance database from our base sample constructed using Thomson Reuters universe, because those are more likely to be due to lack of coverage instead of zero guidance issued (We thus exclude all those firms from our final sample). Following similar logic, for firms that have ever been covered by the database, we only include firm-years starting from the first available guidance observation till the last available observation recorded. Using the above sample two variables are calculated. *Frequency* is the total number of guidance issued within a fiscal year, and *Horizon* is the average number of days between a guidance issuance date and the forecast period end date.

Higher value of frequency indicates higher intensity of voluntary disclosure while larger horizon indicates timelier issuance of the guidance.

D. Control Variable Construction

Our control variables include *Size*, *Leverage*, *Cash Ratio*, *Tobin's Q*, and *ROA*. *Size* is defined as the natural logarithm of total assets; *Leverage* is defined as 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) over total assets; *Cash Ratio* is calculated as cash and cash equivalents over total assets; *Tobin's Q* is defined as total assets net of book value of common stock and preferred stock, and plus market capitalization, over total assets; *ROA* is defined as net income over lagged total assets. All the ratios are winsorized at top and bottom 1 percent to alleviate the distortion of extreme values.

E. Distance-Matched Sample

To address the issue of unbalanced number of control and treated observations in our sample and thus alleviate the concern that the control observations might not be readily comparable to the treated observations, we adopt distance matching technique to select a matched sample for the regression analysis. Specifically, we use Mahalanobis distance matching method¹ to match bound firms with several non-bound firms that are drawn from the exact same year and country using pre-shock firm characteristics variables. The Mahalanobis distance measures how many standard deviations away two vector of covariates are from each other, which is equivalent to the Euclidean distance of two vectors scaled to have unit variance. We use *Size*, *Leverage*, *Cash Ratio* and *ROA* as the covariate for matching, as those are relevant to CRA's criteria in determining the

¹ We use Stata module Mahapick developed by David Kantor to conduct Mahalanobis distance matching, for detail, refer to Kantor (2006).

firm's creditworthiness and are also available for the majority of the firm-year observations. For each of the treated observation (bound firms at sovereign downgrade year), we find the 10 closest control observations from the same year and country. Besides, for bound firms that experience multiple sovereign downgrade event shocks as treated observation, we only use their first shock to find matching control firms. Since the matching technique finds the control observations with replacement, it is possible to have multiple treated observations matched to the same control observation. We thus end up with on average 5.75 number of matched control firms matched to each unique treated firm.

Table 2 presents the summary statistics of voluntary disclosure measures and firm control variables of whole sample, treated and matched control sample respectively as well as the mean differences between the treated and the control groups. The average whole sample *Frequency* of voluntary disclosure is 4.07 times per year, with treated group average (3.5652 times) lower than the control (4.2076 times), while the average whole sample *Horizon* is 208.82 days, with treated group average (239.7 days) larger than the control group (200.3 days). In terms of the firm control variables, the average *Size* is 22.5669, amounting to 6,319 million US dollar. The average firm also has *Leverage* of 29.29%, *Cash Ratio* of 9.51%, *Tobin's Q* of 1.56, *ROA* of 3.67% and *B/M Ratio* of 0.5324. Though having been matched upon multiple dimensions, the treated and the control groups still have significant mean difference along Size, Tobin's Q, and ROA. For one reason, our restrictive exact matching within the exact country-year might not work well for smaller countries where fewer public firms are listed, and for another, as our choice of covariate is highly correlated with the CRA's criteria of credit rating, the control firms would otherwise have the same credit ratings as with the treated firms if they are completely similar on these variables.

To further control for the firm characteristic differences not yet resolved by the matching procedure, we also add those variables as control in our regressions.

3. Results

3.1. Cost of Debt Test

Since the asymmetric downgrade probability between the bound firms and the non-bound firms after the sovereign downgrades are purely mechanical, if the market could fully understand the misinformation nature of the downgrade and take it into account when pricing corporate bonds, there would not be any material impact of this shock on the bound firm even with corporate credit rating downgrades. To confirm that the bound firms indeed face tightening access to financial market post-shock, we examine the change of cost of debt around sovereign downgrade event shocks, which the corporate credit rating should have a first-order effect on.

In particular, we use the log form of yield-to-maturity of corporate bonds to capture the change of corporate cost of debt. For each of the bound firms at downgrade year, we find the non-bound firms that have the top 10 closest distance with the bound firms based on lagged *Size*, *Leverage*, *Cash Ratio*, *Tobin's Q* and *ROA*. We remove any bond with option-like maturity type (callable, puttable, convertible, sinkable, death put, reverse convertible etc.), exclude insured bonds, and exclude inflation linked notes that have floating rates. In our matched sample, we end up with 4505 bond-year observations belonging to 742 unique bonds. Of all the 626 bond-year observations that cover the sovereign downgrade events, 221 comes from the bound firms and 405 comes from the non-bound firms. Using bond-year panel, we conduct the following difference-in-difference regression:

*Cost of Debt*_{it}

$$\begin{aligned}
&= \beta_1 \text{Bound}_{it} + \beta_2 \text{Sovereign Downgrade}_{it} + \beta_3 \text{Bound}_{it} \\
&\quad \times \text{Sovereign Downgrade}_{it} + \beta_4 \text{Bound}_{it} \times \text{Macro}_{ct} + \beta_5 B_{it} \\
&\quad + \beta_6 X_{i,t-1} + \text{Fixed Effects} + \varepsilon_{it}
\end{aligned} \tag{2}$$

where *Bound*_{it} equals to one if a firm has a credit rating above or equal to sovereign credit rating in the previous year end. *Sovereign Downgrade*_{it} is a dummy variable that takes the value of one for the firm-year when there is a sovereign downgrade event taking place. The interaction term *Bound*_{it} \times *Sovereign Downgrade*_{it} captures the additional increase in cost of debt that bound firms experience at the sovereign downgrade year compared with non-bound firms. *Macro*_{ct} represents country-year macroeconomic variables including *GDP Growth*, *GDP per capita*, and *CPI*. The interaction terms *Bound*_{it} \times *Macro*_{ct} capture any differential variation in cost of debt correlated with macroeconomic turbulence, alleviating the potential concern that bound firms' larger exposure to domestic macroeconomic factors driving the main result. *B*_{it} includes bond level control variables *Maturity* and *Coupon Rate*, while *X*_{i,t-1} includes lagged firm control variables *Size*, *Leverage*, *Cash Ratio*, *Tobin's Q* and *ROA*. The regressions also encompass combinations of fixed effects. Table 4 presents the regression results. We add year and country fixed effects for column (1) and (2), country-year fixed effect for column (3) and firm and year fixed effects for column (4). Standard errors are clustered at country-year level to adjust for any correlation structure within country year observations. In all specifications, the interaction terms are significantly positive, with increase ranging from 29.6% to 40.3% of the original cost of debt. In Appendix Table A1, column (2) shows the pre-trend test of cost of debt difference-in-difference regression examining no anticipation effect pre-sovereign downgrade year. We add the lead *Bound*, *Sovereign Downgrade*, and *Bound* \times *Sovereign Downgrade* as well as the macroeconomic interaction terms to capture the effect of sovereign downgrade events on bound/non-bound firms' cost of debt in the year prior to

the sovereign downgrade event. The insignificant interaction term $Bound \times Sovereign\ Downgrade$ indicates that there is no market anticipation effect of the sovereign credit downgrade.

Taken all, the above results suggest that the market is not able to fully recognize the mechanical nature of bound firms' downgrades and therefore the bound firms indeed face higher difficulty accessing the financial market after the sovereign downgrade events, necessitating possible increase in voluntary disclosure from bound firms to remedy market misperception.

3.2. Voluntary Disclosure Baseline and Dynamics Tests

In this section, we estimate the differential change of managerial voluntary disclosure behavior between the bound firms and the non-bound firms around a sovereign downgrade event year. Using a firm-year panel of firm voluntary disclosure with OLS specification, we estimate the following difference-in-difference regression:

$$\begin{aligned} Disclosure_{it} = & \beta_1 Bound_{it} + \beta_2 Sovereign\ Downgrade_{it} + \beta_3 Bound_{it} \\ & \times Sovereign\ Downgrade_{it} + \beta_4 Macro_{ct} + \beta_5 Bound_{it} \times Macro_{ct} \\ & + \beta_6 X_{i,t-1} + Fixed\ Effects + \varepsilon_{it} \end{aligned} \quad (3)$$

The dependent variable $Disclosure_{it}$ is proxied by either *Frequency* or *Horizon* of the managerial guidance. β_3 , the coefficient of the interaction term, captures the differential change of disclosure level between the bound firms and the non-bound firms during the sovereign downgrade year. Table 5 and Table 6 present the regression result for *Frequency* and *Horizon*, respectively. Column (1) shows the regression result with country and year fixed effects to capture any time trend and country time-invariant unobservable factors. The coefficients of interaction term $Bound_{it} \times Sovereign\ Downgrade_{it}$ are statistically significant for both *Frequency* and *Horizon* as dependent variables, indicating the bound firms respond to the credit downgrades by increasing both the

intensity (1.855 times) and the timeliness (70.28 days) more than the bound firms in the aftermath of sovereign downgrade events. The coefficients on *Sovereign Downgrade_{it}* are insignificant, suggesting there is no significant change of voluntary disclosure for non-bound firms during sovereign downgrade year. Column (2) further adds control variables based on the specification from column (1), and the coefficients of interaction term are still statistically significant. In column (3), we replace the country and year fixed effects with country-year fixed effects to control for time variant country unobservable factors, and again get significant interaction terms showing the bound firms increase frequency 1.34 times more and horizon 71.87 days more than the non-bound firms during the sovereign downgrade years. In column (4) we estimate the regression with firm and year fixed effects to control for any time trend and firm level unobservable factors and only capture the time-series variation within the same firm. The interaction terms still remain significantly positive. These results are also economically significant. Using the most restrictive regression specification estimated in column (4), the bound firms are shown to on average increase frequency 34.56% ($=1.232 / 3.5452$) more and horizon 31.13% ($=74.63/239.7$) more than the non-bound firms during sovereign downgrade year.

Our baseline regression captures the difference in voluntary disclosure level between the sovereign downgrade year and that of all other years, assuming the increase in voluntary disclosure during the sovereign downgrade year is transitory. We further trace the dynamics of voluntary disclosure, and formally test whether this increase is transitory or permanent. Table 7 presents the regression result. We augment Equation (2) by adding lead and lags of *Bound_{it}* , *Sovereign Downgrade_{it}* and *Bound_{it} × Sovereign Downgrade_{it}* to capture the change of voluntary disclosure at the year previous to sovereign downgrade shock ($t = -1$), the year of shock ($t = 0$), and one, two, three years after the shock ($t = 1, 2, 3$, respectively). Both results of *Frequency*

in Panel A and *Horizon* in Panel B show a significant interaction term only at the year of shock, indicating the transitory nature of this increase in voluntary disclosure. We conjecture that one-time increase in the voluntary disclosure already suffices for the bound firms to remedy the market understanding and counteract the adverse access to financial market. We will shed more light on this conjecture in later sections with further evidence from corporate bond pricings.

3.3. External Finance Dependence Cross-Sectional Test

In this section, we provide more confirmative evidence on the channel that bound firms issue more voluntary disclosure with the aim to obtain easier access to financial market. A reasonable prediction by this claimed channel is that firms with greater reliance on external financing are expected to have a more profound change of voluntary disclosure than those with less urgent need of external financing. This section is dedicated to test this hypothesis.

Following Rajan and Zingales (1998), we gauge industry-level external finance dependence (EFD) measure using data from U.S. public firms, for the sample period 1990-1999. According to this paper, the U.S. public firms face the most frictionless access to financial market, and thus this measure reflects the pure demand for external financing from the nature of the business. We use a sample period ending prior to our main sample because it captures the pre-determined EFD score and alleviates any endogeneity concern.

We first calculate the external finance dependence score as the fraction of capital expenditure not financed by internally generated cash flows over the whole periods:

$$EFD_i = \frac{\sum_{t=1990}^{1999} (CAPX_{it} - CFO_{it})}{\sum_{t=1990}^{1999} CAPX_{it}} \quad (4)$$

where $CAPX_{it}$ and CFO_{it} is the capital expenditure and cash flow from operations for firm i in year t using COMPUSTAT annual fundamentals. CFO_{it} is defined as the sum of funds from operations (FOPT), plus decreases in inventories (item INVT), decreases in receivables (item RECT), and increases in payables (item AP). For firm-year observations missing cash flow from operations data, we calculated CFO alternatively as the sum of Income Before Extraordinary Items (item IBC), Depreciation and Amortization (item DPC), Deferred Taxes (item TXDC), Equity in Net Loss/Earnings (item ESUBC), Sales of Property, Plant and Equipment and Investments (item SPPIV), and Funds from Operations/Other (item FOPO). To smooth the inter-temporal fluctuations over the business cycle, we first sum up the annual components over the whole sample periods before division to gauge the firm level EFD score. To eliminate the influence of industry outliers and alleviate the concern of large firm observations dominating the measure, we aggregate to industry EFD by taking the median value of individual firms' EFD scores in the same 2-digit SIC code industr. We further define *High EFD* dummy as one for industries with EFD score larger than the median industry, indicating higher reliance on external financing to meet its capital expenditure needs.

We then match the 2-digit SIC industry EFD score percentiles to 2-digit NAICS codes, which is the industry classification code in our main Thomson Reuters sample. We re-estimate the difference-in-difference regression in the previous section allowing interaction term to vary for high/low external finance dependence group respectively. Specifically, we test the following difference-in-difference regression:

$$\begin{aligned}
Disclosure_{it} = & \beta_1 Bound_{it} + \beta_2 Sovereign\ Downgrade_{it} + \beta_3 Bound_{it} \\
& \times Sovereign\ Downgrade \times High\ EFD_{it} + \beta_4 Bound_{it} \\
& \times Sovereign\ Downgrade \times Low\ EFD_{it} + \beta_5 Macro_{ct} + \beta_6 Bound_{it} \\
& \times Macro_{ct} + \beta_7 X_{i,t-1} + Fixed\ Effects + \varepsilon_{it}
\end{aligned} \tag{5}$$

Table 8 presents the estimation results. Using the most restrictive specification with firm and year fixed effect as well as control variables, we find that the interaction term $Bound_{it} \times Sovereign\ Downgrade \times High\ EFD_{it}$ are significantly positive for both *Frequency* and *Horizon* measures, the magnitude similar to the baseline regression, while bound firms in *Low EFD* subsample show no significant incremental change of voluntary disclosure than the non-bound firms in either measure. F-test for the difference of magnitude across two interaction terms shows that the coefficient of $Bound_{it} \times Sovereign\ Downgrade \times High\ EFD_{it}$ is significantly different from $Bound_{it} \times Sovereign\ Downgrade \times Low\ EFD_{it}$ at 1% significance level. Taken all, the result shows that firms with more urgent needs for external financing are hurt more by the misinformation in credit downgrades, and thus respond more profoundly by increasing voluntary disclosure, consistent with the channel that firms increasing voluntary disclosure to counteract the adverse access to financial market caused by credit rating downgrades.

3.4. Analyst Coverage Cross-Sectional Test

In this section, we provide another cross-sectional test to confirm bound firm's motivation of using voluntary disclosure to influence the information environment and resolve market misunderstanding. Previous study finds substitutive role between voluntary disclosure and analyst coverage (Balakrishnan et al., 2014). We hypothesize and test that bound firms respond with more profound change in voluntary disclosure post-shock, when the analysts play a limited role in revealing the firm's true nature of creditworthiness and correcting market misunderstanding.

In particular, we split the bound firms into *High vs. Low Coverage* using the pre-shock year level of analyst coverage to avoid any endogenous change of coverage induced by the event contaminating the result. We then re-estimate the difference-in-difference regression allowing the interaction terms to vary with different levels of analyst coverage:

$$\begin{aligned}
Disclosure_{it} = & \beta_1 Bound_{it} + \beta_2 Sovereign\ Downgrade_{it} + \beta_3 Bound_{it} \\
& \times Sovereign\ Downgrade \times High\ Coverage_{it} + \beta_4 Bound_{it} \\
& \times Sovereign\ Downgrade \times Low\ Coverage_{it} \\
& + \beta_5 Macro_{ct} + \beta_6 Bound_{it} \times Macro_{ct} + \beta_7 X_{i,t-1} + Fixed\ Effects \\
& + \varepsilon_{it}
\end{aligned} \tag{6}$$

The coefficient of $Bound_{it} \times Sovereign\ Downgrade \times Low\ Coverage_{it}$ is expected to be of larger magnitude than that of $Bound_{it} \times Sovereign\ Downgrade \times High\ Coverage_{it}$. Table 9 presents the regression result. Using specification with firm and year fixed effects, both interaction terms are estimated to be significantly positive, while the one with *Low Coverage* shows disproportionally larger statistical and economic significance: the bound firms with low (high) coverage on average increase frequency 3.221 times (1.059 times) and horizon 289.9 days (55.82 days) more than the non-bound firms during the sovereign downgrade year. F-test on the magnitude between the two interaction terms shows that they differ from each other at 1% significance level. This result provides confirmative evidence to the notion that bound firms use voluntary disclosure to in response to the changes of their information environment.

3.5. Effects of Voluntary Disclosure on Cost of Debt Placebo Test

Previous results seem to show that bound firms increase voluntary disclosure to correct the misinformation contained in the credit downgrades in response to their increased cost of debt post-

shock, we yet establish no direct relation between the voluntary disclosure and the cost of debt. Without such evidence, it is equally likely that the voluntary disclosure decision and the changes in cost of debt happen to coincide due to other contemporaneous changes around such shocks. For example, Almeida et al. (2017) shows that the bound firms substitute debt financing with equity financing at sovereign downgrade year. Thus it is possible that the bound firms simply increase voluntary disclosure with the aim to cater to their equity shareholders instead of remedying their access to debt capital market.

However, simply finding evidence of the follow-on reversal of cost of debt for bound firms does not suffice to establish a convincing link, because it could be alternatively due to market's gradual correction of prior misunderstanding instead of voluntary disclosure effectively reducing cost of debt. To that end we conduct a placebo test that use the subsample of bound firms that do not issue voluntary disclosure at sovereign downgrade event year as the placebo group. On average both groups face a higher cost of debt immediately after the sovereign downgrade events, but only VD issuers could possibly supply guidance to the market to correct misinformation and thus neutralize the adverse impact on cost of debt. We could thus conclude on the relationship between voluntary disclosure and cost of debt if we find different trajectories of cost of debt post-shock between issuers and non-issuers group, while failure to find such difference suggest common omitted variables driving the observed results.

Specifically, we conduct the following dynamic difference-in-difference regression allowing the interaction and its lags to vary between issuer and non-issuer bound firms:

*Cost of Debt*_{it}

$$\begin{aligned}
&= \sum_{T=t-3}^t (\beta_{1T}Bound_{iT} + \beta_{2T}Sovereign\ Downgrade_{iT} + \beta_{3T}Bound_{iT} \\
&\quad \times Sovereign\ Downgrade \times Issuer_{iT} + \beta_{4T}Bound_{iT} \\
&\quad \times Sovereign\ Downgrade \times Non - Issuer_{iT}) \\
&\quad + \beta_5Macro_{ct} + \beta_6Bound_{it} \times Macro_{ct} + \beta_7B_{it} + \beta_8X_{i,t-1} \\
&\quad + Fixed\ Effects + \varepsilon_{it}
\end{aligned} \tag{7}$$

We define a bound firm as *Issuer* if it issues at least one voluntary disclosure at sovereign downgrade event year, and *Non-Issuer* otherwise. Table 10 presents the estimation outcome. We find very divergent patterns of cost of debt between issuer and non-issuers leading into the third year after shock. Based on the result from the most restrictive specification in column (4), both issuers and non-issuers face a significantly higher cost of debt at the year of shock. The magnitude of increase is smaller for issuers (33.4%) than non-issuers (63.5%), suggesting the effect of voluntary disclosure has already come into play by the end of the shock year. The difference of cost of debt between the issuers and the non-issuers continue to enlarge in the first year after shock ($t = 1$), where the issuers face only an 17.6% increase from pre-shock level, while non-issuers' increase nearly triples that figure. Starting from the second year after shock, the issuers cost of debt has fully reversed to its pre-shock level, with interaction term insignificant from zero, while the non-issuers still face a statistical and economically significant 25.5% higher cost of debt at the end of the third year after the shock. F-test of magnitude between the issuers and the non-issuers every year shows significant difference at 1% significance level. Taken together, the results suggest that the issuers experience a quick recovery of cost of debt in the aftermath of sovereign

downgrade event, while non-issuers suffer from persistent high cost of debt leading into the third year after shock.

Admittedly using VD issuance only at sovereign downgrade year to define issuers and non-issuers potentially fails to capture any possible post-shock follow-on voluntary disclosure by “non-issuers” according to our definition. Such possibility, however, bias against finding the result presented here because the non-issuers subsample should have experienced even quicker recovery.

It is noteworthy that such result should be interpreted carefully and should not be intended as causal inference on the effect of voluntary disclosure on cost of debt. Since the decision to issue voluntary disclosure is endogenous, there must be other factors that impose a higher marginal cost for the non-issuers to *not to* issue voluntary disclosure at shock year, even with obvious benefit of potential reduction in cost of debt. However, it is a reasonable interpretation that voluntary disclosure provides debt pricing relevant information to the market and thus firms that do issue voluntary disclosure face a lower cost of debt. Any alternative story faces a high hurdle of reconciling the observed divergent cost of debt pattern between the issuers and the non-issuers.

3.6. Additional Validity Tests

One key underlying assumption for our identification strategy is that the asymmetric corporate credit downgrade probability is unrelated to firm fundamentals. Two potential concerns might invalidate the use of this event as exogenous shock.

The first concern is that the different downgrade probability could be caused by worsening fundamentals of bound firms, and thus the corporate downgrades of bound firms are actually true revelation of firms’ creditworthiness. To overcome this concern, we conduct a difference-in-

difference pre-trend test of *Sales*, *EBIT*, *EBITDA*, and *ROA* in the year previous to sovereign downgrade event to explicitly test this possibility:

$$\begin{aligned}
&Fundamental_{it} \\
&= \beta_1 Bound_{i,t+1} + \beta_2 Sovereign\ Downgrade_{i,t+1} + \beta_3 Bound_{i,t+1} \\
&\quad \times Sovereign\ Downgrade_{i,t+1} + \beta_4 Macro_{c,t+1} + \beta_5 Bound_{i,t+1} \\
&\quad \times Macro_{c,t+1} + \beta_6 X_{i,t-1} + Fixed\ Effects + \varepsilon_{it}
\end{aligned} \tag{8}$$

Appendix Table A1 Panel B presents the estimation result. Estimated with firm and year fixed effects, all four regressions show insignificant $Bound_{i,t+1} \times Sovereign\ Downgrade_{i,t+1}$ coefficients for the lead interaction term, suggesting the bound firms don't experience worsening performance prior to the sovereign downgrade year. This result rules out confounding firm fundamental factors driving the result and confirms that the asymmetric credit downgrade probability due to sovereign credit downgrade channel is indeed mechanical.

Another potential concern is that even though the pre-shock fundamentals of bound firms and the non-bound firms are similar, the greater increase in disclosure level by bound firms at sovereign downgrade year is possibly due to the fact that the bound firms have a larger exposure to the macroeconomic fluctuations, and since sovereign credit rating downgrades foreshadow likely domestic macroeconomic deterioration, thus a spurious correlation would show the same results even without the differential credit rating downgrade probability. While our difference-in-difference regressions include the macroeconomic variables and their interaction with bound dummy to capture any variation of voluntary disclosure driven by the fluctuation of macroeconomic factors, in this section, we provide two more validity tests to alleviate this concern.

First, we conduct two placebo tests replacing sovereign credit downgrades with other macroeconomic downturns, which result in the similar negative effect on the bound firms should they be more sensitive to macroeconomic factors, but don't result in the mechanical difference of downgrade probability between the bound firms and the non-bound firms. The bound firms are supposed to react in the same way as in the sovereign downgrade event context, if their documented differential change of voluntary disclosure is purely driven by greater exposure to macroeconomic factors, while failure to find such result repudiates the alternative hypothesis. Specifically, we estimate the following regression:

$$\begin{aligned}
Disclosure_{it} = & \beta_1 Bound_{it} + \beta_2 Placebo\ Event_{it} + \beta_3 Bound_{it} \times Placebo\ Event_{it} \\
& + \beta_4 Macro_{ct} + \beta_5 Bound_{it} \times Macro_{ct} + \beta_6 X_{i,t-1} + Fixed\ Effects \\
& + \varepsilon_{it}
\end{aligned} \tag{9}$$

Table 11 presents the regression results. For the first set of tests, we use recession as placebo event. Specifically, we retrieve the monthly composite leading indicators that provides reference turning points from OECD. Adopting a “from the period following the peak through the trough” method, we define a *Recession* dummy that takes the value of one if the country-year have more than six months in recession within a year. For the second set of tests, we use the global financial crisis in 2007 – 2009 as the placebo event. Both tests show no significant differential change in the voluntary disclosure level between the bound firms and the non-bound firms. It is noteworthy that these results do not necessarily indicate that those macroeconomic events have no effect on firm's disclosure decision, instead, it confirms that the change of disclosure level between bound firm and non-bound firm wouldn't be different without the differential change in the corporate downgrade probability.

Second, in the same light of Almeida et al. (2017), we explicitly test the alternative hypothesis that the bound firms are more exposed to macroeconomic factors by estimating whole time-series correlation between firm fundamentals and the macroeconomic factors. Specifically, we test the following regression:

$$\begin{aligned}
&Fundamental_{it} \\
&= \beta_1 Bound_{it} + \beta_2 Macro_{ct} + \beta_3 Bound_{it} \times Macro_{ct} + \beta_4 X_{i,t-1} \\
&+ Fixed\ Effects + \varepsilon_{it}
\end{aligned} \tag{10}$$

The interaction term $Bound_{it} \times Macro_{ct}$ captures the incremental exposure of bound firms to macroeconomic factors. Appendix Table A4 presents the regression results. We use *Sales*, *EBIT*, *EBITDA* and *ROA* as proxy for $Fundamental_{it}$, and *GDP Growth*, *GDP per capita* and *CPI* as $Macro_{ct}$ for Panel A, B and C, respectively. The fact that none of the interaction terms is significant suffices to rule out the hypothesis that the bound firms are more sensitive to macroeconomic factors.

Taken all, the results in this section further validate our identification strategy and rule out the potential concern arising from the endogenous corporate credit downgrade probability.

4. Conclusion

This paper studies the effect of credit rating change on firm voluntary disclosure decision by exploiting a quasi-natural experiment where the existence of sovereign credit ceiling rule caused asymmetric downgrade probability between firms that are originally rated higher or equal to sovereign credit rating and those that are rated below. We show that bound firms during sovereign downgrade year have a significantly higher increase in both the frequency and timeliness of voluntary disclosure, in response to a deterioration in their access to financial market in terms

of cost of debt due to credit rating downgrades. We also show that bound firms that issue voluntary disclosure on sovereign downgrade event year experience a quick recovery of cost of debt to pre-shock level, while those that don't suffer from prolonged high cost of debt.

The difference-in-difference specification of our tests controls the potential confounding effects of domestic economic downturns that might ensue a sovereign downgrade event. Further tests find evidence that firms with more urgent needs for external financing, and firms that are covered by fewer analysts respond by increasing disclosure level more profoundly. Besides, we validate the sovereign downgrade event as a legitimate exogenous shock to the corporate credit rating and alleviate the potential concern that the asymmetric downgrade probability is related to firm fundamentals with a variety of validation tests.

Our study confirms the channel in which bound firms are incentivized to increase the disclosure by issuing both more frequent and more timely managerial guidance, in an attempt to actively contribute to the information environment facing the firm, when one of a very important information intermediary, the credit rating agencies, issue credit ratings that fail to fully reflect the true nature of firm's fundamentals. Our study also sheds new light on the effects of voluntary disclosure in containing information relevant to the pricing of corporate debt.

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Figure 1. Relative Corporate Rating Distribution

The figure presents the distribution of relative corporate rating with respect to the sovereign rating (i.e. corporate rating minus sovereign rating) for the firm's country of domicile at the year previous to sovereign downgrade events. The x-axis is the relative corporate rating and y-axis is the number of firm-year observations. The treated group ("Bound" firms), i.e. firms with credit rating equal or above the sovereign credit rating are colored in red, and other firm-year observations ("Non-bound" firms) are in blue.

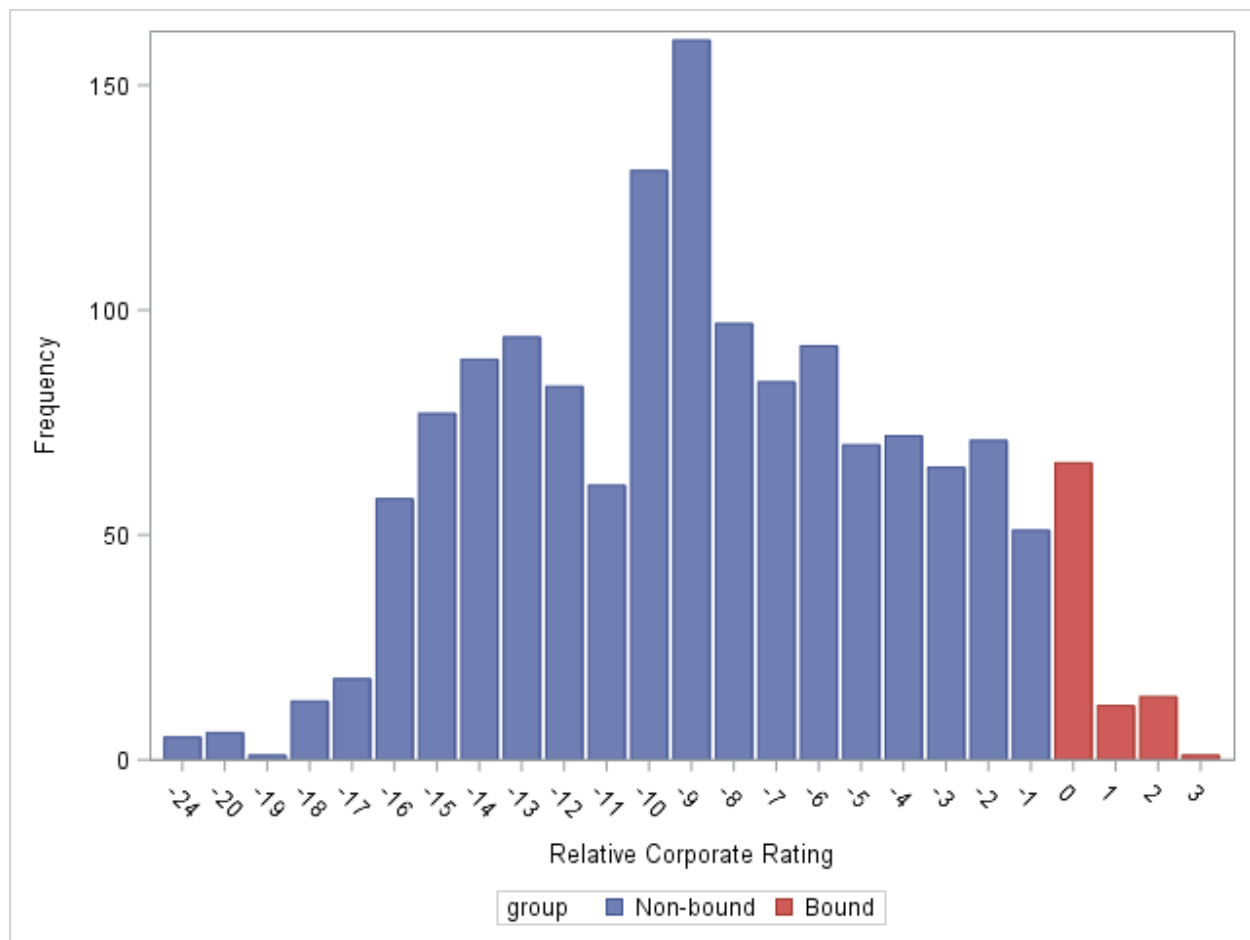


Table 1. Sovereign Downgrade Events

The table presents the sovereign downgrade events in this study. The number of bound firms indicates the number of firms that have a foreign currency long-term issuer rating higher or equal to the sovereign credit rating the previous year end.

Country	Downgrade Year	Sovereign Rating		Number of Bound Firms
		Before	After	
Argentina	2001	BB-	SD	10
	2008	B+	B-	3
	2012	B	B-	1
	2013	B-	CCC+	2
Brazil	2002	BB-	B+	6
Hungary	2012	BB+	BB	1
Ireland	2011	A	BBB+	1
Italy	2004	AA	AA-	1
	2006	AA-	A+	2
	2011	A+	BBB+	2
	2013	BBB+	BBB	7
Japan	2002	AA	AA-	2
	2011	AA	AA-	14
Mexico	2009	BBB+	BBB	4
Philippines	2005	BB	BB-	4
Portugal	2010	A+	A-	1
	2011	A-	BBB-	2
Spain	2012	AA-	BBB-	2
US	2011	AAA	AA+	3
Total				68

Table 2. Summary Statistics

The table presents the mean of variables in the matched sample, group by whole sample, treated and control, while median reported in square bracket and standard deviation in parenthesis. Treated group includes firms that are ever a bound firm during a sovereign downgrade year. Control group includes all other firms from the matched sample. T-statistics of mean difference is reported. *Frequency* is the total number of managerial guidance issued within a fiscal year. *Horizon* is the average number of days between a managerial guidance and the corresponding forecast period end date. Both measures are winsorized at top and bottom 1 percent. *Size* is defined as the natural logarithm of total assets; *Leverage* is defined as 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) over total assets; *Cash Ratio* is calculated as cash and cash equivalents over total assets; *Tobin's Q* is defined as total assets net of book value of common stock and preferred stock, and plus market capitalization, over total assets; *ROA* is defined as net income over lagged total assets. All the ratios are winsorized at top and bottom 1 percent.

	Whole Sample	Treated	Control	Diff	t-stat
Frequency	4.0693 [3.0000] (3.6149)	3.5652 [3.0000] (2.9792)	4.2076 [3.0000] (3.7604)	-0.6424***	2.73
Horizon	208.8186 [192.9286] (128.7358)	239.7 [222.3214] (128.1)	200.3 [187.7083] (127.7)	39.4097***	4.14
Size	22.5669 [22.7924] (1.8257)	23.0769 [23.1858] (1.7484)	22.4513 [22.6958] (1.8232)	0.6256***	-8.98
Leverage	0.2919 [0.2853] (0.1945)	0.3014 [0.2930] (0.1980)	0.2897 [0.2835] (0.1937)	0.0117	1.56
Cash Ratio	0.0951 [0.0716] (0.0894)	0.0932 [0.0631] (0.1038)	0.0955 [0.0732] (0.0858)	-0.00234	0.60
Tobin' Q	1.5631 [1.3394] (0.8319)	1.6643 [1.4433] (0.7724)	1.5403 [1.3109] (0.8431)	0.1240***	3.92
ROA	0.0367 [0.0311] (0.0781)	0.0491 [0.0417] (0.0592)	0.0339 [0.0284] (0.0815)	0.0152***	6.15

Table 3. Probability of Corporate Downgrade Difference-in-Difference

The table presents the linear probability model difference-in-difference regression result for annual firm panel. The dependent variable, *Corporate Downgrade Dummy*, takes the value of one if the firm is downgraded in the particular firm-year. *Bound* is the dummy variable that takes the value of one if the firm has a credit rating above or equal to the sovereign credit rating in the previous fiscal year end. *Sovereign Downgrade* is a dummy variable that takes the value of one if there is a sovereign downgrade event for the corresponding country of domicile and quarter. *GDP Growth*, *GDP per capita* and *CPI* are annual macroeconomic control variables at annual frequency from the corresponding country of domicile. Control variable include *Size*, *Leverage*, *Cash Ratio*, *Tobin's Q*, and *ROA* of the previous fiscal year end. All the ratios are winsorized at top and bottom 1 percent. The regression also includes different combinations of fixed effects. Standard errors clustered at country-year are reported in parenthesis. ***, **, * indicate significance at 1%, 5%, 10% level respectively.

VARIABLES	Corporate Downgrade Dummy			
	(1)	(2)	(3)	(4)
Bound	0.108 (0.0698)	0.0936 (0.0731)	0.0780 (0.0712)	0.191* (0.111)
Sovereign Downgrade	0.00257 (0.0226)	-0.0160 (0.0251)		-0.00869 (0.0253)
Bound × Sovereign Downgrade	0.361*** (0.0799)	0.352*** (0.0822)	0.332*** (0.0862)	0.317*** (0.0850)
Bound × GDP Growth	-0.461*** (0.174)	-0.461*** (0.173)	-0.406** (0.186)	-0.397** (0.176)
Bound × GDP per capita	-0.00243 (0.00163)	-0.00210 (0.00171)	-0.00156 (0.00165)	-0.00487 (0.00296)
Bound × CPI	0.0101 (0.00715)	0.00882 (0.00738)	0.00977 (0.00874)	0.00885 (0.00820)
GDP Growth	-0.0217 (0.0705)	0.00241 (0.0798)		-0.0124 (0.0771)
GDP per capita	-0.00665 (0.00430)	-0.00702 (0.00430)		-0.00703 (0.00454)
CPI	0.00929** (0.00415)	0.0101* (0.00531)		0.0119*** (0.00441)
Observations	2,021	1,800	1,789	1,799
R-squared	0.116	0.127	0.186	0.212
Controls	NO	YES	YES	YES
Year FE	YES	YES	NO	YES
Country FE	YES	YES	NO	NO
Firm FE	NO	NO	NO	YES
Country-Year FE	NO	NO	YES	NO

Table 4. Cost of Debt Difference-in-Difference

The table presents the cost of debt regression result around sovereign downgrade events. The sample include annually cost of debt data. The dependent variable, *Cost of Debt*, is the log form of yield-to-maturity of corporate bonds the firm issued in quarterly frequency. *Bound* is a dummy variable that takes the value of one if the firm has a credit rating above or equal to sovereign credit rating in the previous year end. *Sovereign Downgrade* is a dummy variable that takes the value of one for firm-quarter when there is a sovereign downgrade event taking place. The main variable of interest, *Bound* \times *Sovereign Downgrade* is the interaction term of the two. *GDP Growth*, *GDP per capita* and *CPI* are annual macroeconomic control variables at annual frequency from the corresponding country of domicile. Bond Control variables include *Maturity* and *Coupon Rate* and Firm Control variables include *Size*, *Leverage*, *Cash Ratio*, *Tobin's Q*, and *ROA* of the previous fiscal year end. The regression also includes a variety of combinations of fixed effects. Standard errors clustered by country-year are reported in parenthesis. ***, **, * indicates significance at 1%, 5%, 10% level respectively.

VARIABLES	Cost of Debt			
	(1)	(2)	(3)	(4)
Bound	-0.648** (0.274)	-0.111 (0.228)	-0.112 (0.254)	-0.487 (0.372)
Sovereign Downgrade	-0.117 (0.0939)	-0.220*** (0.0643)		-0.261*** (0.0580)
Bound \times Sovereign Downgrade	0.296*** (0.0816)	0.360*** (0.0691)	0.365*** (0.0754)	0.403*** (0.0403)
Bound \times GDP Growth	0.849* (0.442)	0.650*** (0.213)	0.648*** (0.241)	0.128 (0.207)
Bound \times GDP per capita	0.0122* (0.00620)	-0.000218 (0.00500)	-0.000451 (0.00543)	0.00315 (0.00850)
Bound \times CPI	-0.0350 (0.0251)	-0.00530 (0.0258)	-0.000956 (0.0268)	0.0170 (0.0243)
GDP Growth	-0.289 (0.395)	0.330 (0.312)		0.510* (0.302)
GDP per capita	0.0829*** (0.0215)	0.0760*** (0.0169)		0.0676*** (0.0166)
CPI	0.0143 (0.0339)	0.0687*** (0.0237)		0.0343 (0.0236)
Observations	4,223	4,218	4,201	4,217
R-squared	0.340	0.692	0.719	0.764
Bond Controls	NO	YES	YES	YES
Firm Controls	NO	YES	YES	YES
Year FE	YES	YES	NO	YES
Country FE	YES	YES	NO	NO
Firm FE	NO	NO	NO	YES
Country-Year FE	NO	NO	YES	NO

Table 5. Voluntary Disclosure Frequency Difference-in-Difference

The table presents the difference-in-difference regression results of voluntary disclosure frequency around sovereign downgrade events. The dependent variable, *Frequency* is the total number of managerial guidance issued within a fiscal year. The measure is winsorized at top and bottom 1 percent. *Bound* is a dummy variable that takes the value of one if the firm has a credit rating above or equal to sovereign credit rating in the previous year end. *Sovereign Downgrade* is a dummy variable that takes the value of one for firm-quarter when there is a sovereign downgrade event taking place. The main variable of interest, *Bound* \times *Sovereign Downgrade* is the interaction term of the two. *GDP Growth*, *GDP per capita* and *CPI* are annual macroeconomic control variables at annual frequency from the corresponding country of domicile. Control variable includes *Size*, *Leverage*, *Cash Ratio*, *Tobin's Q*, and *ROA* of the previous fiscal year end. All the ratios are winsorized at top and bottom 1 percent. The regression also includes different combinations of fixed effects. Standard errors clustered by country-year are reported in parenthesis. ***, **, * indicate significance at 1%, 5%, 10% level respectively.

VARIABLES	Frequency			
	(1)	(2)	(3)	(4)
Bound	2.402*** (0.640)	2.208*** (0.564)	1.928*** (0.654)	2.301*** (0.801)
Sovereign Downgrade	-0.0421 (0.276)	-0.00834 (0.290)		-0.00502 (0.169)
Bound × Sovereign Downgrade	1.855*** (0.676)	1.537*** (0.532)	1.346** (0.536)	1.232** (0.485)
Bound × GDP Growth	0.199 (2.504)	0.0911 (2.447)	-0.781 (2.660)	0.159 (2.064)
Bound × GDP per capita	-0.0690*** (0.0153)	-0.0739*** (0.0136)	-0.0695*** (0.0152)	-0.0649*** (0.0240)
Bound × CPI	-0.346** (0.139)	-0.449*** (0.134)	-0.510*** (0.158)	-0.201* (0.120)
GDP Growth	-1.603* (0.947)	-1.268 (1.112)		-2.067* (1.205)
GDP per capita	0.0117 (0.0603)	-0.0295 (0.0719)		-0.0480 (0.0473)
CPI	0.00662 (0.0607)	0.0744 (0.0726)		-3.70e-06 (0.0691)
Size		0.662*** (0.103)	0.750*** (0.105)	0.518 (0.352)
Leverage		0.452 (0.775)	0.499 (0.782)	0.914 (1.125)
Cash Ratio		-2.014*** (0.758)	-2.453*** (0.779)	-0.944 (1.740)
Tobin's Q		0.517*** (0.177)	0.627*** (0.178)	0.655*** (0.159)
ROA		-2.148 (1.947)	-1.750 (2.177)	-1.374 (1.654)
Observations	1,062	1,016	1,003	1,006
R-squared	0.313	0.343	0.374	0.689
Year FE	YES	YES	NO	YES
Country FE	YES	YES	NO	NO
Firm FE	NO	NO	NO	YES
Country-Year FE	NO	NO	YES	NO

Table 6. Voluntary Disclosure Horizon Difference-in-Difference

The table presents the difference-in-difference regression results of voluntary disclosure frequency around sovereign downgrade events. The dependent variable, *Horizon* is the average number of days between a managerial guidance and the corresponding forecast period end date. The measure is winsorized at top and bottom 1 percent. *Bound* is a dummy variable that takes the value of one if the firm has a credit rating above or equal to sovereign credit rating in the previous year end. *Sovereign Downgrade* is a dummy variable that takes the value of one for firm-quarter when there is a sovereign downgrade event taking place. The main variable of interest, $Bound \times Sovereign\ Downgrade$ is the interaction term of the two. *GDP Growth*, *GDP per capita* and *CPI* are annual macroeconomic control variables at annual frequency from the corresponding country of domicile. Control variable includes *Size*, *Leverage*, *Cash Ratio*, *Tobin's Q*, and *ROA* of the previous fiscal year end. All the ratios are winsorized at top and bottom 1 percent. The regression also includes different combinations of fixed effects. Standard errors clustered by country-year are reported in parenthesis. ***, **, * indicate significance at 1%, 5%, 10% level respectively.

VARIABLES	Horizon			
	(1)	(2)	(3)	(4)
Bound	78.60** (31.13)	83.58** (32.91)	77.82** (38.76)	133.3** (52.02)
Sovereign Downgrade	-11.98 (10.85)	-14.93 (10.72)		-13.82 (9.919)
Bound × Sovereign Downgrade	70.28*** (25.88)	76.58*** (27.33)	71.87** (30.63)	74.63*** (26.80)
Bound × GDP Growth	116.1 (86.35)	149.8 (93.15)	108.3 (94.05)	74.17 (97.40)
Bound × GDP per capita	-1.430** (0.661)	-1.508** (0.699)	-1.322* (0.795)	-3.405*** (1.257)
Bound × CPI	-6.079 (5.278)	-7.880 (5.478)	-9.176 (6.373)	-8.148 (5.892)
GDP Growth	16.82 (51.83)	5.872 (53.77)		7.269 (57.56)
GDP per capita	1.287 (2.112)	0.915 (2.016)		2.817 (2.192)
CPI	3.492 (2.697)	4.836 (2.957)		3.769 (3.003)
Size		4.208 (4.236)	4.097 (4.301)	-29.91 (22.48)
Leverage		13.12 (24.74)	12.04 (25.88)	-48.20 (64.51)
Cash Ratio		-95.57*** (36.28)	-114.5*** (37.59)	-112.8* (58.81)
Tobin's Q		7.048 (5.178)	10.63** (5.316)	11.13* (6.037)
ROA		-92.81 (68.91)	-89.81 (74.64)	-121.9 (93.00)
Observations	1,062	1,016	1,003	1,006
R-squared	0.149	0.141	0.207	0.336
Year FE	YES	YES	NO	YES
Country FE	YES	YES	NO	NO
Firm FE	NO	NO	NO	YES
Country-Year FE	NO	NO	YES	NO

Table 7. Voluntary Disclosure Frequency and Horizon Dynamic Regression

The table presents the dynamic difference-in-difference regression results of voluntary disclosure frequency around sovereign downgrade events. *Frequency* is the total number of managerial guidance issued within a fiscal year. *Horizon* is the average number of days between a managerial guidance and the corresponding forecast period end date. Both measures are winsorized at top and bottom 1 percent. *Bound* is a dummy variable that takes the value of one if the firm has a credit rating above or equal to sovereign credit rating in the previous year end. *Sovereign Downgrade* is a dummy variable that takes the value of one for firm-quarter when there is a sovereign downgrade event taking place. The main variable of interest, *Bound* \times *Sovereign Downgrade* is the interaction term of the two. Macro Control Main Effects include *GDP Growth*, *GDP per capita* and *CPI* at annual frequency from the corresponding country of domicile, while 2-way Interaction includes their interaction with *Bound*. Control variable includes *Size*, *Leverage*, *Cash Ratio*, *Tobin's Q*, and *ROA* of the previous fiscal year end. All the ratios are winsorized at top and bottom 1 percent. The regression also includes different combinations of fixed effects. Standard errors clustered by country-year are reported in parenthesis. ***, **, * indicate significance at 1%, 5%, 10% level respectively.

VARIABLES	Panel A: Frequency			
	(1)	(2)	(3)	(4)
Bound \times Sovereign Downgrade at:				
t = -1	0.134 (0.353)	-0.155 (0.300)	-0.0664 (0.364)	-0.00919 (0.426)
t = 0	1.627*** (0.552)	1.537*** (0.573)	1.371** (0.538)	1.337** (0.584)
t = 1	-0.0442 (0.366)	-0.112 (0.401)	-0.242 (0.536)	0.0340 (0.393)
t = 2	0.662 (0.620)	0.711 (0.653)	0.598 (0.674)	0.904* (0.519)
t = 3	0.796* (0.411)	0.823* (0.442)	0.596 (0.584)	0.926** (0.413)
Observations	936	916	904	906
R-squared	0.334	0.367	0.391	0.727
Bound and Sovereign Downgrade Main Effects (lead and lags), Macro Control Main Effects and 2-way Interaction	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Year FE	YES	YES	NO	YES
Country FE	YES	YES	NO	NO
Firm FE	NO	NO	NO	YES
Country-Year FE	NO	NO	YES	NO

VARIABLES	Panel B: Horizon			
	(1)	(2)	(3)	(4)
Bound \times Sovereign Downgrade at:				
t = -1	17.66 (25.36)	10.81 (23.91)	10.43 (23.34)	9.605 (26.34)
t = 0	85.70*** (29.34)	83.79*** (30.11)	79.35** (34.06)	87.08*** (31.75)
t = 1	15.97 (35.35)	16.11 (36.65)	12.96 (40.65)	30.74 (40.26)
t = 2	7.444 (28.25)	3.476 (29.45)	0.198 (28.93)	15.99 (29.85)
t = 3	24.55 (27.45)	26.84 (25.96)	28.88 (27.04)	49.12 (31.34)
Observations	936	916	904	906
R-squared	0.112	0.121	0.184	0.343
Bound and Sovereign Downgrade Main Effects (lead and lags), Macro Control Main Effects and 2- way Interaction	YES	YES	YES	YES
Year FE	YES	YES	NO	YES
Country FE	YES	YES	NO	NO
Firm FE	NO	NO	NO	YES
Country-Year FE	NO	NO	YES	NO

Table 8. External Finance Dependence Heterogeneous Treatment Effect

The table presents the difference-in-difference regression with heterogeneous treatment effect between high vs. low EFD firms. EFD is calculated using 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, *Frequency* is the total number of managerial guidance issued within a fiscal year. *Horizon* is the average number of days between a managerial guidance and the corresponding forecast period end date. Both measures are winsorized at top and bottom 1 percent. *Bound* is a dummy variable that takes the value of one if the firm has a credit rating above or equal to sovereign credit rating in the previous year end. *Sovereign Downgrade* is a dummy variable that takes the value of one if there is a sovereign downgrade event for the corresponding country of domicile and year. The main variable of interest, *Bound* \times *Sovereign Downgrade*, is the interaction of the two. Control variable includes *Size*, *Leverage*, *Cash Ratio*, *Tobin's Q*, and *ROA* of the previous fiscal year end. All the ratios are winsorized at top and bottom 1 percent. The regression also includes firm and year fixed effects. Standard errors clustered by country-year are reported in parenthesis. The p-value of F-test result for differences of magnitude between two interaction terms are reported in square bracket. ***, **, * indicate significance at 1%, 5%, 10% level respectively.

VARIABLES	Frequency	Horizon
Bound	2.347*** (0.817)	144.4*** (50.76)
Sovereign Downgrade	-0.0229 (0.165)	-11.06 (9.383)
(A) Bound \times Sovereign Downgrade \times High EFD	1.327** (0.560)	71.52** (28.90)
(B) Bound \times Sovereign Downgrade \times Low EFD	-0.590 (0.402)	-32.37 (28.24)
Bound \times GDP Growth	-0.371 (1.865)	49.20 (100.1)
Bound \times GDP per capita	-0.0663*** (0.0245)	-3.514*** (1.250)
Bound \times CPI	-0.193* (0.114)	-9.568* (5.480)
GDP Growth	-2.114* (1.214)	-13.16 (57.46)
GDP per capita	-0.0489 (0.0500)	2.798 (2.098)
CPI	0.0187 (0.0722)	4.514 (3.000)
F-test for differences across (A) and (B) [p-value]	[0.0042]	[0.0073]
Observations	962	962
R-squared	0.690	0.342
Controls	YES	YES
Year FE	YES	YES
Firm FE	YES	YES

Table 9. Analyst Coverage Heterogeneous Treatment Effect

The table presents the difference-in-difference regression with heterogeneous treatment effect between high vs. low analyst coverage firms. Analyst coverage is calculated as the total number of analysts issuing forecast of the firm in the previous fiscal year. The dependent variable, *Frequency* is the total number of managerial guidance issued within a fiscal year. *Horizon* is the average number of days between a managerial guidance and the corresponding forecast period end date. Both measures are winsorized at top and bottom 1 percent. *Bound* is a dummy variable that takes the value of one if the firm has a credit rating above or equal to sovereign credit rating in the previous year end. *Sovereign Downgrade* is a dummy variable that takes the value of one if there is a sovereign downgrade event for the corresponding country of domicile and year. The main variable of interest, *Bound* \times *Sovereign Downgrade*, is the interaction of the two. Control variable includes *Size*, *Leverage*, *Cash Ratio*, *Tobin's Q*, and *ROA* of the previous fiscal year end. All the ratios are winsorized at top and bottom 1 percent. The regression also includes firm and year fixed effects. Standard errors clustered by country-year are reported in parenthesis. The p-value of F-test result for differences of magnitude between two interaction terms are reported in square bracket. ***, **, * indicate significance at 1%, 5%, 10% level respectively.

VARIABLES	Frequency	Horizon
Bound	2.324*** (0.799)	135.7** (52.58)
Sovereign Downgrade	-0.0162 (0.168)	-15.03 (9.815)
(A) Bound \times Sovereign Downgrade \times High Coverage	1.059** (0.497)	55.82** (23.85)
(B) Bound \times Sovereign Downgrade \times Low Coverage	3.221*** (0.575)	289.9*** (56.89)
Bound \times GDP Growth	-0.0754 (2.047)	48.81 (97.51)
Bound \times GDP per capita	-0.0649*** (0.0239)	-3.410*** (1.271)
Bound \times CPI	-0.213* (0.120)	-9.431 (5.793)
GDP Growth	-2.047* (1.200)	9.450 (57.34)
GDP per capita	-0.0492 (0.0479)	2.690 (2.126)
CPI	0.00691 (0.0693)	4.517 (3.052)
F-test for differences across (A) and (B) [p-value]	[0.0013]	[0.0001]
Observations	1,006	1,006
R-squared	0.688	0.301
Year FE	YES	YES
Country FE	NO	NO
Firm FE	YES	YES

Table 10. Heterogeneous Treatment Effects on Cost of Debt Dynamics

The 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, *Frequency* is the total number of managerial guidance issued within a fiscal year. *Horizon* is the average number of days between a managerial guidance and the corresponding forecast period end date. Both measures are winsorized at top and bottom 1 percent. *Bound* is a dummy variable that takes the value of one if the firm has a credit rating above or equal to sovereign credit rating in the previous year end. *Sovereign Downgrade* is a dummy variable that takes the value of one if there is a sovereign downgrade event for the corresponding country of domicile and year. The main variable of interest, $Bound \times Sovereign\ Downgrade$, is the interaction of the two. Control variable includes *Size*, *Leverage*, *Cash Ratio*, *Tobin’s Q*, and *ROA* of the previous fiscal year end. All the ratios are winsorized at top and bottom 1 percent. The regression also includes firm and year fixed effects. Standard errors clustered by country-year are reported in parenthesis. The p-value of F-test results for differences of magnitude between two interaction terms are reported in square bracket. ***, **, * indicate significance at 1%, 5%, 10% level respectively.

VARIABLES	Cost of Debt			
	(1)	(2)	(3)	(4)
Bound \times Sovereign Downgrade:				
(A1) \times Issuer t = 0	0.138 (0.224)	0.283** (0.125)	0.130 (0.118)	0.334*** (0.106)
(A2) \times Non-Issuer t = 0	0.248** (0.108)	0.434*** (0.100)	0.373*** (0.129)	0.635*** (0.0744)
(B1) \times Issuer t = 1	0.0857 (0.244)	0.215 (0.139)	0.154 (0.119)	0.176** (0.0856)
(B2) \times Non-Issuer t = 1	0.881*** (0.149)	0.671*** (0.118)	0.677*** (0.155)	0.521*** (0.0886)
(C1) \times Issuer t = 2	-0.00762 (0.213)	0.175 (0.136)	0.0831 (0.132)	0.0490 (0.0808)
(C2) \times Non-Issuer t = 2	0.472*** (0.117)	0.413*** (0.0883)	0.399*** (0.0954)	0.299*** (0.0613)
(D1) \times Issuer t = 3	-0.224 (0.151)	0.0379 (0.127)	0.115 (0.146)	-0.0887 (0.0810)
(D2) \times Non-Issuer t = 3	0.508*** (0.0638)	0.537*** (0.0820)	0.494*** (0.0885)	0.255** (0.109)
F-test for differences across (A1) and (A2) [p-value]	0.6428	0.2151	0.0068	0.0055
F-test for differences across (B1) and (B2) [p-value]	0.0176	0.0004	0.0003	0.0003
F-test for differences across (C1) and (C2) [p-value]	0.1061	0.0665	0.0137	0.0006
F-test for differences across (C1) and (C2) [p-value]	0.0000	0.0000	0.0123	0.0081
Observations	2,396	2,396	2,379	2,396
R-squared	0.540	0.795	0.814	0.840
Bound and Sovereign Downgrade	YES	YES	YES	YES
Main Effects, Macro Control Main Effects and 2-way Interaction				
Bond Controls	NO	YES	YES	YES
Firm Controls	NO	YES	YES	YES
Year FE	YES	YES	NO	YES
Country FE	YES	YES	NO	NO
Firm FE	NO	NO	NO	YES
Country-Year FE	NO	NO	YES	NO

Table 11. Placebo Event Test

The table presents the placebo test result of voluntary disclosure around placebo events. The dependent variable, *Frequency* is the total number of managerial guidance issued within a fiscal year. *Horizon* is the average number of days between a managerial guidance and the corresponding forecast period end date. Both measures are winsorized at top and bottom 1 percent. *Bound* is a dummy variable that takes the value of one if the firm has a credit rating above or equal to sovereign credit rating in the previous year end. *Placebo Event* is a dummy variable that takes the value of one if there is a corresponding placebo event (recession, or 2007-2009 financial crisis, respectively) for the country of domicile and year. The main variable of interest, *Bound* \times *Placebo Event*, is the interaction of the two. Control variable includes *Size*, *Leverage*, *Cash Ratio*, *Tobin's Q*, and *ROA* of the previous fiscal year end. All the ratios are winsorized at top and bottom 1 percent. The regression also includes firm and year fixed effects. Standard errors clustered by country-year are reported in parenthesis. ***, **, * indicate significance at 1%, 5%, 10% level respectively.

VARIABLES	Recession		07-09 Financial Crisis	
	Frequency	Horizon	Frequency	Horizon
Bound	2.259*** (0.831)	135.7** (52.74)	2.240*** (0.810)	130.5** (50.35)
Placebo Event	-0.215 (0.181)	-26.01* (13.39)		
Bound \times Placebo Event	0.00963 (0.412)	11.75 (24.79)	0.205 (0.274)	19.91 (26.68)
Bound \times GDP Growth	0.247 (2.024)	88.97 (100.7)	0.108 (2.032)	73.27 (99.28)
Bound \times GDP per capita	-0.0615** (0.0244)	-3.385** (1.349)	-0.0607** (0.0237)	-3.187** (1.284)
Bound \times CPI	-0.164 (0.134)	-7.102 (7.056)	-0.177 (0.119)	-7.279 (6.275)
GDP Growth	-1.931 (1.198)	15.61 (61.65)	-2.003 (1.208)	7.979 (57.59)
GDP per capita	-0.0419 (0.0479)	3.714 (2.309)	-0.0502 (0.0489)	2.701 (2.103)
CPI	0.0209 (0.0704)	5.717 (3.929)	0.00733 (0.0694)	4.048 (3.017)
Observations	1,006	1,006	1,006	1,006
R-squared	0.687	0.334	0.687	0.332
Controls	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

Table A1. Difference-in-Difference Pre-Trend Test

The table presents the difference-in-difference pre-trend test for various outcome variables at the year prior to the sovereign downgrade events. Panel A reports the results of linear *Corporate Downgrade Probability* and *Cost of Debt* as dependent variable for column (1) and (2), respectively. Panel B reports the results of firm fundamentals (*Sales*, *EBIT*, *EBITDA*, and *ROA*) as dependent variable. *Bound* is the dummy variable that takes the value of one if the firm has a credit rating above or equal to the sovereign credit rating in the previous fiscal year end. *Sovereign Downgrade* is a dummy variable that takes the value of one if there is a sovereign downgrade event for the corresponding country of domicile and quarter. *Macro Variables* include *GDP Growth*, *GDP per capita* and *CPI* at annual frequency from the corresponding country of domicile. The lead of above mentioned variables are included in the regression to capture the effect of sovereign downgrade year effect at previous year. Control variable include *Size*, *Leverage*, *Cash Ratio*, *Tobin's Q*, and *ROA* of the previous fiscal year end (except for ROA regression of Panel B where ROA is omitted as independent variable). All the ratios are winsorized at top and bottom 1 percent. The regression also includes firm and year fixed effects. Standard errors clustered at country-year are reported in parenthesis. ***, **, * indicate significance at 1%, 5%, 10% level respectively.

Panel A: Corporate Downgrade Probability and Cost of Debt		
VARIABLES	(1) Corporate Downgrade Probability	(2) Cost of Debt
Bound at t = -1	0.210 (0.141)	0.363 (0.248)
Sovereign Downgrade at t = -1	0.0267 (0.0302)	0.00425 (0.0635)
Bound × Sovereign Downgrade at t = -1	-0.0211 (0.0818)	0.0293 (0.0514)
Bound × GDP Growth at t = -1	-0.0619 (0.165)	0.193 (0.234)
Bound × GDP per capita at t = -1	-0.00624* (0.00334)	-0.0157*** (0.00570)
Bound × CPI at t = -1	0.00106 (0.0203)	0.00623 (0.0211)
Observations	1,662	3,469
R-squared	0.192	0.780
Lead Macro Variables	YES	YES
Bond Controls	NO	YES
Firm Controls	YES	YES
Year FE	YES	YES
Country FE	NO	NO
Firm FE	YES	YES

Panel B: Firm Fundamentals

VARIABLES	Sales	EBIT	EBITDA	ROA
Bound at t = -1	-0.0332 (0.199)	-0.406** (0.181)	-0.266*** (0.0845)	-0.0163 (0.0120)
Sovereign Downgrade at t = -1	0.0416 (0.0544)	-0.0350 (0.0386)	-0.00257 (0.0230)	-0.00988* (0.00566)
Bound × Sovereign Downgrade at t = -1	-0.0175 (0.0632)	0.0506 (0.0678)	-0.00615 (0.0306)	0.00472 (0.00559)
Bound × GDP Growth at t = -1	-0.732 (0.474)	0.00768 (0.177)	-0.0722 (0.102)	-0.0111 (0.0254)
Bound × GDP per capita at t = -1	0.00330 (0.00395)	0.0098* (0.00512)	0.0079*** (0.00294)	0.00035 (0.000302)
Bound × CPI at t = -1	-0.0198 (0.0204) (0.0102)	0.0270* (0.0137) (0.00824)	0.0154** (0.00739) (0.00840)	0.00048 (0.00159) (0.00177)
Observations	2,765	3,318	3,439	3,558
R-squared	0.904	0.921	0.959	0.427
Lead Macro Variables	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

Table A4. Firm Fundamental Macroeconomics Exposure Test

The table presents the regression results of firm fundamentals on macroeconomic condition variable. *Bound* is the dummy variable that takes the value of one if the firm has a credit rating above or equal to the sovereign credit rating in the previous fiscal year end. The macroeconomic variables are *GDP Growth*, *GDP per capita* and *CPI* at annual frequency from the corresponding country of domicile, for Panel A, B and C respectively. Control variable include *Size*, *Leverage*, *Cash Ratio*, *Tobin's Q*, and *ROA* of the previous fiscal year end (except for ROA regression where ROA is omitted as independent variable). All the ratios are winsorized at top and bottom 1 percent. The regression also includes firm and year fixed effects. Standard errors clustered at country-year are reported in parenthesis. ***, **, * indicate significance at 1%, 5%, 10% level respectively.

Panel A: GDP Growth				
VARIABLES	Sales	EBIT	EBITDA	ROA
Bound	-0.249 (0.198)	-0.103 (0.0645)	0.00496 (0.0476)	-0.00672 (0.00418)
GDP Growth	1.015*** (0.382)	0.166 (0.174)	0.528*** (0.152)	0.0302 (0.0212)
Bound × GDP Growth	-0.243 (0.547)	-0.000639 (0.203)	0.0451 (0.156)	0.0170 (0.0224)
Size	1.148*** (0.193)	0.610*** (0.0439)	0.698*** (0.0364)	-0.00914 (0.0149)
Leverage	0.318 (0.283)	0.284 (0.191)	0.260* (0.143)	-0.0164 (0.0356)
Cash Ratio	0.874* (0.459)	0.166 (0.227)	0.258 (0.198)	0.128*** (0.0371)
Tobin's Q	0.0275 (0.0295)	0.142*** (0.0288)	0.123*** (0.0211)	0.0175*** (0.00353)
ROA	2.383*** (0.832)	2.858*** (0.409)	1.753*** (0.306)	
Observations	1,602	1,769	1,820	1,857
R-squared	0.849	0.912	0.955	0.435
Year FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

Panel B: GDP per capita				
VARIABLES	Sales	EBIT	EBITDA	ROA
Bound	-0.526 (0.351)	-0.139 (0.110)	-0.0884 (0.0826)	-0.0105 (0.00836)
GDP per capita	0.0294* (0.0171)	0.0246** (0.0103)	0.0133* (0.00711)	0.00193* (0.000983)
Bound × GDP per capita	0.0104 (0.00642)	0.00195 (0.00395)	0.00373 (0.00304)	0.000209 (0.000233)
Size	1.113***	0.603***	0.671***	-0.0105

	(0.206)	(0.0438)	(0.0438)	(0.0147)
Leverage	0.331	0.307	0.263*	-0.0157
	(0.283)	(0.191)	(0.144)	(0.0358)
Cash Ratio	0.856*	0.166	0.252	0.128***
	(0.460)	(0.225)	(0.197)	(0.0370)
Tobin's Q	0.0394	0.144***	0.128***	0.0179***
	(0.0308)	(0.0290)	(0.0213)	(0.00355)
ROA	2.447***	2.857***	1.811***	
	(0.825)	(0.406)	(0.307)	
Observations	1,602	1,769	1,820	1,857
R-squared	0.850	0.913	0.955	0.440
Year FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

Panel C: Consumer Price Index				
VARIABLES	Sales	EBIT	EBITDA	ROA
Bound	-0.191	-0.129	0.0170	-0.00678
	(0.247)	(0.0846)	(0.0600)	(0.00524)
CPI	-0.0103	-0.00324	-0.0108	-0.000215
	(0.0292)	(0.00636)	(0.00809)	(0.000844)
Bound × CPI	-0.0302	0.000294	-0.00694	0.000231
	(0.0222)	(0.0108)	(0.00892)	(0.000958)
Size	1.159***	0.643***	0.707***	-0.0153
	(0.199)	(0.0461)	(0.0377)	(0.0145)
Leverage	0.375	0.248	0.205	0.00534
	(0.308)	(0.196)	(0.144)	(0.0345)
Cash Ratio	0.726	0.136	0.168	0.128***
	(0.468)	(0.234)	(0.210)	(0.0366)
Tobin's Q	0.0255	0.133***	0.115***	0.0173***
	(0.0295)	(0.0291)	(0.0202)	(0.00365)
ROA	2.503***	3.005***	2.018***	
	(0.831)	(0.396)	(0.297)	
Observations	1,540	1,696	1,745	1,775
R-squared	0.845	0.914	0.956	0.435
Year FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES