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## Sovereign Ceilings “Lite”? The Impact of Sovereign Ratings on Corporate Ratings in Emerging Market Economies

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**IMF Working Paper**

Research Department

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**Prepared by Eduardo Borensztein, Kevin Cowan, and Patricio Valenzuela\***

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**Abstract**

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Although credit rating agencies have gradually moved away from a policy of never rating a private borrower above the sovereign (the “sovereign ceiling”) it appears that sovereign ratings remain a significant determinant of the credit rating assigned to corporations. We examine this link using data for advanced and emerging economies over the past decade and conclude that the sovereign ratings have a significant and robust effect on private ratings even after controlling for country specific macroeconomic conditions and firm-level performance indicators. This suggests that public debt management affects the private sector through a channel that had not been previously recognized.

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## I. INTRODUCTION

Sovereign debt in emerging market economies affects the domestic economy through a variety of channels, some of which are not entirely apparent but still powerful. One of the less studied channels is the impact that public debt may have on corporations' credit ratings in international markets, and thus on the cost of credit for the private sector. When the sovereign has a credit rating that is not at the high end of the scale, credit ratings for firms from that country will tend to suffer, regardless of their financial soundness. This channel constitutes a potential source of negative externality for the private sector in emerging market economies. In the short run, governments need to be aware of the potential effects of rating announcements on private capital flows. In the medium run, they should factor these externalities into their decisions on external borrowing.

Moreover, there is a close relationship between credit ratings and spreads on bonds.<sup>1</sup> Figure 1 displays this relationship for sovereign bonds, US firms and emerging economy firms on September 1, 2005. The steeper slope of the sovereign spreads curve is a permanent feature over time, perhaps reflecting the expectation of a longer and more uncertain recovery process in the case of sovereign defaults. The figure suggests that a sovereign ceiling can be quite onerous for private borrowers. At lower rating levels, a single credit rating notch downgrade may represent 50 basis points in spread.

Until 1997, credit rating agencies never granted a private company a credit rating higher than the rating given to the issues by the sovereign, a policy that was termed the "sovereign ceiling" in financial markets. The rating agencies state that this policy has been relaxed somewhat over time, starting in 1997. The relaxation first applied to three "dollarized" economies: Argentina, Panama, and Uruguay. The reasoning was that, in highly dollarized economies (or fully dollarized ones), the government would be less likely - or able - to impose exchange controls in case of a sovereign default, and thus the credit standing of private issuers would not be affected by a potential sovereign default (Standard & Poor's, 1997). Although the sovereign ceiling policy has been gradually relaxed by the credit rating agencies, and some private sector borrowers do indeed receive credit ratings higher than the governments in their countries, rating agencies themselves recognize that the sovereign rating is still an important consideration in determining private ratings, a sort of sovereign ceiling "lite" policy (Standard & Poor's, 2001b).

Is there a valid basis for a sovereign ceiling policy or is it merely a residual bias from a time where financial and foreign exchange markets were very different from today in emerging economies? There are at least three channels through which the creditworthiness of the

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<sup>1</sup> But note that causality is likely to run in both directions (see Borensztein, Levy Yeyati and Panizza, 2006 and Levy Yeyati and Gonzalez Rozada, 2006).

government may affect that of the private sector. The first channel is the negative impact that a sovereign default has on the domestic economy on the whole, which undermines the financial strength of the private sector broadly. The second channel is the “spillover” effect from the insolvency of the sovereign to private debtors. A sovereign in default may undertake measures that directly affect the private sector’s ability to repay, such as resorting to inflationary financing and large tax increases. The third channel is through the imposition of direct capital controls or other administrative measures that effectively prevent private borrowers from servicing their external obligations when the sovereign reaches a situation of default or near-default. The first and second channels imply a positive *correlation* between private and public ratings but no sovereign ceiling. On average, firms in countries with riskier governments will be riskier, but there is no reason why they could not have a higher rating than the government. The third channel, by contrast, does provide a rationale for a sovereign ceiling: on account of the imposition of capital controls, the private sector always defaults on its external obligations when the sovereign defaults.

It is noteworthy, concerning this third channel, that exchange controls have been relatively short-lived and limited in recent defaults. Furthermore, defaults by sovereign borrowers have not always resulted in widespread defaults by private borrowers in that country. Between 1975 and 1995, Standard & Poor’s has documented that private corporations defaulted in 68 percent of the cases of sovereign default in which there was significant private sector debt outstanding. In the two sovereign default cases that are included in the data set that we use in this paper - Indonesia in 2000 and Argentina in 2001 - the results were opposite to each other. None of the private Indonesian firms with an international credit rating initiated a debt restructuring when their sovereign was declared in default, while the vast majority of the Argentine firms did.

Previous literature examining systematically the sovereign ceiling is scant.<sup>2</sup> The pioneering paper is Durbin and Ng (2005) who focus on market spreads to examine whether investors validate a sovereign ceiling policy in their own perceptions of creditworthiness. They found that, in many cases, corporate bonds traded at spreads that were narrower than those of the sovereign, and that this happened more often for firms with high export earnings or an ownership link with either a foreign corporation or the home government. In the same vein, Peter and Grandes (2005) studied yields of local-currency corporate bonds in South Africa and found that sovereign risk was an important determinant of yields and that the sovereign ceiling was pierced by multinational companies but loomed large in the case of financial firms.

Ferri, Lui and Majnoni (2001) and Ferri and Liu (2002) studied the impact of sovereign ratings on private ratings directly. Ferri, Lui and Majnoni (2001) used an error correction framework to

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<sup>2</sup> There is, however, a broader literature on sovereign credit ratings more generally, which is less directly related with the subject of this paper.

regress changes in private credit ratings of banks and non-financial corporations on changes in sovereign credit ratings. They found a positive and significant correlation, which is significantly higher in emerging market economies, and for rating downgrades. Ferri and Liu (2002) took a different approach and estimated the impact on the firms' credit ratings of sovereign ratings and firm-level financial indicators. They found that sovereign ratings have a significant effect on private ratings in emerging market economies, and that firm-level variables-which were specified in a weighted average aggregate form-were generally statistically insignificant.

This paper expands this literature in four directions. First, it simultaneously controls for firm-level financial variables and macroeconomic conditions in the country when estimating the impact of sovereign ratings on private firms' ratings. Omission of either one of these groups of variables could bias the estimated effect of sovereign ratings. Second, it includes firm-level variables individually in the regressions rather than as an aggregate, which uses the explanatory power of these variables more efficiently. Third, it splits firms by economic sector, focusing on differences across the tradable and non-tradable sectors. Fourth, it explores several additional non-linearities and asymmetries in the sovereign-private rating correlation, and the probability distribution of corporate ratings, which help to characterize the sovereign ceiling influence.

Our main empirical result is that there is still a significant and robust sovereign ceiling effect on the ratings of corporations, even though some borrowers are able to pierce it. This effect is financially significant (on average, a sovereign rating two notches lower implies a private rating one notch lower) and robust to controlling for firm level financial indicators of creditworthiness and the macroeconomic conditions in the country. Furthermore, we find that the effect varies across countries, and economic sectors. There is a stronger effect on emerging market firms and on firms producing non-tradable goods, who have cash flows in domestic currency. It is also asymmetrical: sovereign downgrades have a stronger impact than upgrades, while the impact of changes in sovereign rating on private rating is stronger if the private rating was already hitting the "sovereign ceiling" in the previous period. Contrary to previous evidence, we also find that firm-level financial ratios are significantly correlated with their credit rating, after controlling for time-varying macroeconomic conditions.

These results shed some light on the rationale for the influence of sovereign ratings on private ones. We argue that the asymmetric effects of sovereign rating upgrades and downgrades, and the larger effect of sovereign changes on private firms whose ratings are close to that of the sovereign are hard to explain with a simple framework in which sovereign risk spills over to private credit ratings (the first two channels discussed above). An alternative explanation in which ratings agencies continue to impose a sovereign ceiling on *most* firms, despite their individual financial situation, would be consistent with these findings. We label this impact of the sovereign rating that goes beyond the simple correlation a "sovereign ceiling lite," that is, a ceiling that is not an absolute constraint but that pushes down corporate ratings. We also find

evidence that firm level financial variables are correlated with corporate ratings in both emerging and industrial economies, contrary to previous empirical findings.

The rest of this paper is organized as follows. Section II provides some background on credit ratings in emerging economies and the sovereign ceiling. Section III presents the empirical methodology applied in this paper. Section IV describes the data used in the estimations. Section V displays the empirical results, and Section VI provides some conclusions.

## II. PRIVATE CREDIT RATINGS AND THE SOVEREIGN CEILING

Emerging market economies started to seek credit ratings in the 1990s, when they once again started to issue bonds in global markets. Although bonds had traditionally been the main borrowing instruments of sovereigns, the instrument basically disappeared from global financial markets after the economic collapses in the 1930s, and international syndicated bank loans became the dominant mechanism for developing countries borrowing in the 1970s. These loans went largely into default in the early 1980s, and the restructuring of those debts into “Brady Bonds” created the current version of the international bond market for these economies.

Before the 1990s, Standard & Poor’s rated only a dozen sovereigns, almost all of them at the top (AAA) rating category. Similarly, Moody’s had rated only 11 countries up to 1980, and they were all in the investment grade range. This means that there is a fairly short experience in observing the evolution of sovereign ratings, especially compared with the century-long corporate ratings (Moody’s, 2003). Prior to the 1990s, the only “ratings” data available for emerging economies are those assigned by publications such as *Institutional Investor*, and *Euromoney*. In contrast to the credit rating agencies these are financial publications that have rated sovereigns on the basis of surveys of investors and analysts. Although these ratings are expressed on a scale that is broadly consistent with that of the credit rating agencies, it is noteworthy that these are merely survey measures, while the rating agencies provide a professional service to bond issuers and their ratings are a factor in investment mandates and capital requirements.<sup>3</sup>

The sovereign rating is an assessment of the probability of default in government debt. A government default is defined by the credit rating agencies as either (i) a missed payment or (ii) a distressed debt exchange implying a diminished financial obligation by the government. The credit rating agencies state that they look at a 5-year horizon and evaluate a large number of economic and political factors, and make qualitative and quantitative assessments, when rating a sovereign bond. However, Cantor and Packer (1996) find that eight variables explain more than

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<sup>3</sup> Nevertheless, early studies have focused on such ratings, including ul-Haque, Kumar, Mark and Mathieson (1996) and ul-Haque, Mark and Mathieson (1998).

90 percent of the variance of sovereign ratings assigned by both Moody's and Standard & Poor's. The eight variables are: per capita income, GDP growth, inflation, fiscal balance, current account balance, debt-to-export ratio, an indicator variable of advanced economy, and an indicator variable of default since 1970.

Although the rating agencies claim that their success in predicting sovereign default is comparable to that on corporate defaults (Moody's, 2003) there have been some notorious cases of misjudgment. In the Asian crises, the rating agencies were criticized for reacting too late (IMF, 1999) and later for overreacting, notably in the case of Korea (Huhne, 1998, Reisen and von Maltzan, 1999, and Reisen, 2003). Famously, Uruguay maintained an investment grade rating until early 2002, even after a financial crisis had already erupted in Argentina, and even in Uruguay. Only months later, Uruguay had no option but to restructure its sovereign debt. In fact, the agencies have been accused of aggravating financial crises by being excessively pro-cyclical in their ratings (Ferri, Liu and Stiglitz, 1999). It seems, however, that ratings are if anything too sticky rather than excessively pro-cyclical (Mora, 2004).

Although cases such as Uruguay in 2002 are extreme, precipitous falls in the agencies' estimation are not rare. Table 1 shows that rating agencies' perceptions of sovereign creditworthiness can change quickly. Leaving aside the case of Venezuela, the top panel of Table 1 displays 13 cases of defaults. In almost half of these cases (six), the rating was closer to investment grade than to default just one year before the default.<sup>4</sup> The *Institutional Investor* ratings of the 1980s, displayed in the bottom panel of Table 1, give an even starker picture. One year prior to the occurrence of default, over 90 percent of the ratings were closer to investment grade than to default. In fact, in almost 40 percent of the cases the rating was the equivalent to investment grade in the rating agencies' scales.

The rating agencies state that the credit rating of the sovereign has had an important bearing on the ratings achieved by private companies and banks. For example, Standard and Poor's (2001a) stresses that sovereign credit risk is always a key consideration in the assessment of the credit standing of banks and corporations. The main argument is that governments facing a situation of financial distress or default may force private sector defaults by imposing exchange controls and other restrictive measures. As argued above, however, evidence from default episodes suggest that sovereign default does not always imply corporate default. Therefore, a sovereign ceiling (even of the "lite" variety) may not capture corporate risk adequately.

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<sup>4</sup> In the case of Venezuela, the 2005 default corresponds largely to an oversight on the part of the government of the payment of an oil-price linked bond clause that took a little too long to be redressed. Although the country did receive a "selective default" rating briefly, there was never the expectation that Venezuela would attempt to restructure the terms of its debt.

The “lightening” of the sovereign ceiling can be appreciated from Figures 2 and 3. The figures show the relationship between Standard and Poor’s (S&P) ratings granted to corporate and borrowers and their government. S&P ratings are mapped into twenty-one numerical categories, with 21 corresponding to the highest rating (AAA) and 1 to the lowest (D). The figures show that, until 1996, corporate ratings never exceeded the sovereign level. After 1997, a few corporations’ ratings started to pierce the sovereign ceiling and then only to a limited degree. In our sample of ratings, in the post-1997 period, 79 percent of the corporations received a rating lower than the sovereign, 15 percent received the same rating and just 5 percent received a rating higher than the sovereign. Figures 4 and 5 split the 1997-2004 sample into Emerging Market Economies (EMEs) and Developed Economies (DEs). It is clear from the figures that a sovereign ceiling is much more of an issue for emerging market firms, as the ratings received by their sovereigns are much lower. A larger fraction of EME firms have received the same ratings than their sovereign.

### III. FRAMEWORK

There are at least three reasons why we would expect a positive correlation between sovereign and corporate ratings. The first relates to country specific macro vulnerabilities that make both forms of debt risky. Exposure to large external shocks, via terms of trade for example, is one such source of vulnerability. By increasing the variance of profits for firms and tax receipts for governments higher macro volatility increases the probability of default. Note that this channel introduces a positive correlation (unconditional) between the probability of government’s default and the probability of private’s default. Note also that there is no reason why despite this correlation private debt should be on average riskier than government debt.

The second reason for a positive correlation is the “spillover” effect from the sovereign default to private debtors. A sovereign in default may undertake measures that directly affect the private sector’s ability to repay. Inflationary financing and tax increases are both forms of such spillovers. Sovereign default may also have a direct impact on private sector solvency and liquidity by generating a credit crunch in both domestic and international financial markets, as agents exposed to sovereign debt react to the direct effects on their net worth of the sovereign default<sup>5</sup>. Once again this channel generates a positive correlation between the probability of sovereign and corporate default: firms in countries with riskier governments should, *ceteris paribus*, be more risky than their counterparts in countries with safe government debt. As in the previous case, despite the correlation there is no reason *a priori* for why a firm may not have a lower default risk, and hence a better rating than a sovereign.

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<sup>5</sup> The issue of contagion “via Wall-Street” has received considerable recent attention (Calvo, 2005). Recent research on ‘institutional’ determinants of contagion confirms this view by linking financial contagion to characteristics of developed economy markets and investors. Private sector borrowing may be ‘contaminated’ by a sovereign default if they both belong to a particular asset class (Rigobon, 2001), borrow from the same banks (Van Rijckeghem and Weder, 2000) or share a set of overexposed mutual funds (Borensztein and Gelos, 2003).

The final reason for a positive correlation between private and sovereign ratings -and the reason cited historically by the rating companies for the credit ceiling- is the closure of the capital account or foreign exchange rate markets in times of sovereign default. If the sovereign defaults, then the private sector must also default on the external debt because they cannot access the dollars they need and/or get them out of the country. Imposing these restrictions implies that private debt will always be riskier than sovereign debt: the private firm defaults in all those states of the world in which the public sector defaults and then some, because of idiosyncratic risk in some additional states.

The central empirical question of this study is to measure the effect of sovereign credit ratings on private ones when appropriately controlling for other factors that affect private ratings directly. Our basic specification posits that the credit rating  $Rtg_{isct}$  of a firm  $I$ , belonging to industry  $s$ , in country  $c$ , during period  $t$ , is given by:

$$Rtg_{isct} = \alpha + \beta X_{it} + \phi D_s + \lambda Z_{ct} + \delta Sov\_Rtg_{ct} + \mu_{it} \quad (1)$$

where  $X_{it}$  are firm-level determinants of idiosyncratic risk,  $D_s$  are dummy variables for industry sectors,  $Z_{ct}$  are country-level macroeconomic variables that affect the risk level of all firms in the economy, and  $Sov\_Rtg_{ct}$  is the sovereign credit rating. The parameter of interest in this estimation is  $\delta$ .

To calculate a quantitative measure for  $Rtg_{isct}$  we follow the existing literature and map the credit rating categories into twenty-one numerical values, with the value of 21 corresponding to the highest rating and 1 to the lowest one<sup>6</sup>. This scale is presented in Table 2, which also shows a description of the situation implied by each rating category. As discussed above, each credit rating implies a certain probability of default.

The vector  $X$  contains accounting variables that affect firm level default probability. Although the ratings include both quantitative and qualitative information, because of data limitations we concentrate on the quantitative determinants of financial risk. We follow the literature on corporate default and include variables that capture the firm's profitability, leverage, liquidity and interest coverage and size. These variables are standard in both the discriminant analysis literature and in papers that estimate default probability models, such as the Zeta Credit Risk

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<sup>6</sup> This approach follows the procedure adopted in Cantor and Packer (1996) and Reinhart (2002).

Model for corporations<sup>7</sup>. Table 3 describes these variables in some detail. Naturally, these financial ratios may not fully account for the credit risk implied by a corporation at a point in time. To control for biases arising from these possible omissions, we also include country-time fixed effects (to control for common time-varying characteristics for firms within the same country) and industry sector fixed effects (to control for time- invariant firm characteristics at the industry sector level)<sup>8</sup>.

The key right-hand side variable from the above specification is the sovereign rating. We build this variable in exactly the same way as we build the private rating. In addition, in some specifications we include additional macro controls -the vector  $Z$ - to control for factors that affect both sovereign and corporate risk.  $Z$  comprises the set of variables that the sovereign rating literature has argued are positively correlated with sovereign risk. In particular, we include per capita GDP, GDP growth in previous period, volatility of the growth rate of GDP in the previous ten years, inflation during the previous year and last period current account deficit<sup>9</sup>. In some specifications, we also include the ratio of external debt to exports, although our sample size drops considerably when we include this variable. Note that in some specifications we take a more agnostic view, and use country time fixed effects to control for common factors across firms in a country year.

#### IV. SAMPLE

Our data consists of firm-level observations for the period 1995 to 2004, a period spanning episodes of substantial instability in emerging markets. Our main source of information is the Bloomberg database on publicly traded firms, which also includes accounting data for the credit-rated firms. The sample is an unbalanced panel of 509 non-financial corporations from 30 countries.

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<sup>7</sup> See Altman (2000). We tested the robustness of our results to the inclusion of additional firm level financial variables drawn from Moyer (1977) and Blume, Lim and Mackinlay (1998). Our results are robust to these alternative specifications. We are, however, leaving aside a third strand of the corporate default literature – that based on option pricing models. We do this because of the data and computational requirements of this methodology, and the high level of noise that may affect emerging economies' stock markets, from which equity prices must be read.

<sup>8</sup> We also included firm fixed effects. The results do not change.

<sup>9</sup> See Cantor and Packer (1996) for a detailed discussion. In cross section of sovereign ratings, they find that upwards of 90% of variance can be explained by these five variables.

Our main dependent variable is the private credit rating issued by S&P, which we use because of its extensive coverage of corporations from emerging economies and its overall consistency. We exclude corporations from countries with a sovereign rating of AAA over the whole sample period because the lack of variance in the main determinant would affect the quality of the regressions. We only use foreign currency long term issuer's ratings, to avoid inconsistencies arising from different types of debt issues<sup>10</sup>. Moreover, most of the emerging markets issue international bonds in foreign currency (Eichengreen, Hausmann, and Panizza, 2001).

In addition, the database contains firm level accounting information used as control variables of the private rating. To build these ratios we modify the Bloomberg data in two ways:

- For the size of the firms, we deflate asset data to 2000 values using December-to-December changes in the consumer price index (CPI), and convert them to U.S. dollars using the market exchange rate for December 2000.
- For all variables, we compute the indicator ratio and construct a  $z$ -score using the sample mean and standard deviation. We drop all firm/year observations that have values  $|z| > 6$ .

The Appendix describes the variables in fuller detail and Table 4 presents descriptive statistics for the main variables we use.

## V. RESULTS

The frequency distribution of corporate credit ratings provides a direct window into the question of whether a sovereign ceilings policy *de facto* persists even after its relaxation in 1997. This approach is inspired by nonparametric tests of whether constraints are binding.<sup>11</sup> The premise is that if no sovereign ceiling is binding, then corporate ratings should have a smooth distribution. By contrast, a bunching of corporate ratings around the sovereign rating would be evidence of a binding sovereign ceiling. Figure 6 plots the histogram of the gap between corporate and sovereign ratings in the period 1998-2004, that is, after the sovereign ceiling policy was relaxed.

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<sup>10</sup> Standard and Poor's (2001a) defines Foreign Currency Credit Rating as "A current opinion of a obligor's overall capacity to met its foreign-currency-denominated financial obligations. It may take the form of either an issuer or an issue credit rating. As in the case of local currency credit ratings, a foreign currency credit opinion on Standard and Poor's global scale is based on the obligor's individual credit characteristics, including the influence of country or economic risk factors. However, unlike local currency ratings, a foreign currency credit rating includes transfer and other risks related to sovereign actions that may directly affect access to the foreign exchange needed for timely servicing of the rated obligation. Transfer and other direct sovereign risks addressed in such ratings include the likelihood of foreign-exchange control and the imposition of other restrictions on the repayment of foreign debt."

<sup>11</sup> For example, the test of whether minimum wages are binding (Maloney and Nuñez, 2001). We are indebted to Ugo Panizza for suggesting this nonparametric test.

The large spike at 0 is evidence of bunching around the sovereign rating and provides a strong preliminary evidence of a persistent sovereign ceiling effect.

### **A. Financial and Sector Variables Determinants of Corporate Rating**

Using the methodology and database described in the previous two sections we explore the determinants of private credit ratings focusing, in particular, on the estimated coefficient on the sovereign rating variable. We start our analysis by estimating determinants of private ratings at the firm and sector level, and then we add the effect of sovereign ratings and other aggregate controls to the estimated model.

Table 5 reports the value of the coefficients obtained when estimating equation (1) by ordinary least squares with clustering of the errors by country and year for robustness (see Petersen, 2005). Column (1) includes firm and sector variables – effectively setting  $\lambda$  and  $\delta$  to zero. The results are in line with existing empirical literature on corporate default in advanced economies. Most variables, with the exception of the ratios of earnings to assets and of working capital to assets, have the expected sign and are significant at conventional confidence levels. The results of the coefficients on sector dummies also have the expected signs. Sectors that face more volatile demand (for example pro-cyclical sectors like construction) report a higher likelihood of default given a set of financial ratios. Others, for example the utility sector, have lower default risk because price regulations often allows these firms to rise prices to maintain solvency in times of financial distress (Packer, 2002).

Recognizing that macroeconomic factors will also affect the probability of default (volatility of output and demand, liquidity crunches in the banking sector, etc.) column (2) incorporates country-year dummies to the specification. Not surprisingly the  $R^2$  jumps considerably. A joint test on the country dummies rejects the null hypothesis at 1%. With the country controls in place our results are closely aligned with our priors and previous empirical results. All variables except working capital have the expected signs and are significant at conventional confidence levels. Hence, there is a positive correlation between private ratings and the two measures of profitability (retained earnings and current earnings), debt coverage (EBIT to interest expense) and size. Our measure of leverage (equity to assets) is also positively correlated with ratings. The estimated coefficient on working capital is negative and significant – contrary to previous findings and our priors. Lagging the RHS variables to control for possible endogeneity issues (as reported in column 3) has a negligible effect on the estimated coefficients.

This result is in contrast to Ferri and Liu's (2002) finding that firm-level financial variables have little or no impact on credit ratings in emerging market economies. They reach this conclusion by estimating the  $\beta$  coefficients in the full sample of countries, and then incorporating  $X\hat{\beta}$  (the predicted effect of the firm level variables on ratings) in a regression that also includes the sovereign rating. They find that the estimated coefficient on  $X\hat{\beta}$  is not

significantly different from zero in the sub-sample of EM economies. One reason for that result may be that credit rating agencies weigh firm-level variables differently for emerging economies than for advanced ones. By estimating  $\beta$  in a sample where a large share of observations are from advanced economies, the estimated values will be closer to the population values for these economies, biasing the estimated coefficient on  $X\hat{\beta}$  downwards in emerging economies. With this problem in mind, in columns (4) and (5) we split our sample into advanced and emerging economies. Using this specification, we find that firm level variables *are* significant determinants of credit ratings in the emerging economies sub-sample, and that the estimated coefficients are different from the estimates for corporations in advanced economies. In particular, the estimated coefficients on retained earnings, working capital and size vary significantly between the two groups of economies.<sup>12</sup>

### B. Impact of Sovereign Ratings on Corporate Ratings

We move next to our main empirical question, the effect of sovereign ratings on corporate credit ratings. Table 6 reports the results. The specification is identical to that reported in column (2) of Table 5, but instead of country-year fixed effects we now incorporate the sovereign rating variable,  $S\_Rtg_{ct}$ , as a right-hand side variable. As reported in column (1) we find a significant positive correlation between the sovereign and private ratings. The estimated coefficient implies that two notches in the sovereign rating move the average private rating up by one notch for companies based in that country<sup>13</sup>.

As discussed above, sovereign and corporate credit ratings will be correlated if both are driven by macroeconomic variables that render both public and private debt more risky. Omitting these variables would bias the estimate of  $\delta$  upwards. To address this issue, column (2) includes a set of macroeconomic variables that the literature has found are correlated with sovereign credit ratings: lagged inflation, GDP growth, current account deficit over GDP, GDP per capita and an industrial country dummy (see Cantor and Packer, 1996). In addition, we add a direct measure of aggregate volatility, the variance of the growth rate of GDP in the previous 10 years. (see Appendix for details)

We find that firms from countries with higher current account deficits have lower average ratings, as expected. The negative and significant coefficients on GDP per capita and industrial

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<sup>12</sup> Statistical tests reject the null hypothesis of equality in the values of the parameters across the two groups of economies.

<sup>13</sup> In unreported regressions we replicate the specification from column (1) using lagged right-hand side variables to control again for possible endogeneity issues. Also we replicate (1) using the smaller half of the firms, as measured by assets. In both cases the results remain broadly unchanged.

dummy confirms that there are more firms below the sovereign rating in high income countries<sup>14</sup> (recall Figures 4 and 5). Column (3) reports a similar estimation for a sub sample of countries for which data on external debt is available. In line with our priors – higher external debt is correlated with lower ratings. We find in all cases that the estimated coefficient on  $S\_Rtg_{ct}$  remains positive and significant. Even after controlling for macro variables correlated with the probability of sovereign and corporate default there remains a significant impact of sovereign credit ratings.

Columns (4) and (5) of Table 6 split the sample into developed economies and emerging market economies. We find that the effect of sovereign credit ratings in emerging countries is twice as high as that of industrial countries. This is in line with previous results by Ferri, Liu and Majnoni (2001), although our specification is more complete.

### C. Tradable Sector vs. Non-Tradable Sector

We would expect firms whose output is oriented to the domestic market to be more sensitive to country risk, as the macroeconomic impact of sovereign default may take a higher toll on them, and furthermore, not having direct foreign currency earnings, they are more vulnerable to the imposition of capital controls. With this in mind, column (6) augments regression (2) with an interaction between the sovereign rating and a tradable sector dummy. In fact, the non-tradable sector is more affected by sovereign default risk than the tradable sector. The coefficients are 0.7 and 0.5, respectively.

Finally, in column (7) of Table 6 we include interactions between the sovereign rating and year dummies post 1995. We find that there has indeed been a relaxation in the sovereign ceilings policy but this has been very gradual.

### D. Asymmetries

If the effect of sovereign ratings is caused by spillovers or common macroeconomic effects, the effect should be symmetric. Upgrades should have the same effect as downgrades, and firms in all credit rating categories should be affected in a similar way. Our first test of asymmetries in the effect of sovereign ratings focuses on whether the impact is differential for upgrades and downgrades of the sovereign. We do this by estimating equation (1) in first differences, and allowing for differentiated effects of the changes in sovereign rating that are positive and negative. The results, in column (1) of Table 7 show that the effect is indeed higher for downgrades, in fact three times higher. A one-notch sovereign downgrade causes an estimated

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<sup>14</sup> In unreported regressions that exclude the sovereign rating, the estimated coefficients on both GDP per capita and the high income dummy are positive and significant.

private downgrade of half a notch, but a one-notch sovereign upgrade only causes an estimated private upgrade of one-sixth of a notch.

Next, Column (2) allows the effect of changes in the sovereign rating to differ between those firms that were hitting the ceiling (had ratings equal to that of the sovereign) in the previous period and the ones that were not. Again, spillovers or common macro effects imply that all firms should be affected equally by the sovereign rating change. The estimated coefficients suggest that this is not the case. Sovereign rating changes have a much larger effect on firms whose rating was the same as the sovereign rating, which reaches almost a one-for-one effect. Finally, column (3) reports a regression that incorporates all the asymmetries simultaneously, and allowed for a differential impact in advanced and emerging economies.<sup>15</sup> All in all, we find that the relationship between changes in sovereign and corporate ratings is non linear and asymmetric.

Our final exercise, depicted in Figure 7, attempts to pin down this nonlinearity using a systematic framework. First, using the parameters values estimated for firms in a sub-sample of countries for which the sovereign rating is AAA (these firms are thus unconstrained by sovereign ceilings) we build a rating forecast for the firms in non-AAA countries. If there were no sovereign ceiling, then there should be a one to one relationship between the actual corporate rating and this predicted corporate rating (as shown by the solid line). A strict sovereign ceiling would create a constraint as shown by the dotted line -with no firm rated above the sovereign. The shaded area depicts a sovereign ceiling “lite” situation. To implement this framework, we estimated the following equation for the period 1997–2004:

$$Rtg_{isct} = \alpha + \beta_0 \hat{Rtg}_{isct} + \beta_1 (\hat{Rtg}_{isct} - Sov\_Rtg_{ct}) I[\hat{Rtg}_{isct} \geq Sov\_Rtg_{ct}] + \beta_2 I[\hat{Rtg}_{isct} \geq Sov\_Rtg_{ct}] + \mu_{it} \quad (2)$$

where  $\hat{Rtg}_{isct}$  is the predicted corporate rating using the coefficients obtained for firms in triple-A countries (and thus with no sovereign ceiling). If there was no sovereign ceiling effect,  $\beta_0$  would equal 1 and  $\beta_1$  would equal 0. If there was an absolute sovereign ceiling,  $\beta_0 = 1$ ,  $\beta_1 = -1$ . If there is a sovereign ceiling lite,  $\beta_0 = 1$  and  $-1 < \beta_1 < 0$ . The last term in the equation is included to make sure that the estimate of  $\beta_1$  is not biased. The coefficients and robust standard errors estimated from equation (2) are reported in Table 8. The results are broadly in line with a sovereign ceiling lite hypothesis. Note, however, that the sovereign rating probably also affects those firms that have ratings well below the sovereign level. The credit rating agencies would likely want the corporate ratings to recognize the different levels of creditworthiness of private

<sup>15</sup> We included only the sectoral dummy for the utility sector, which is the only statistically significant sector in this specification.

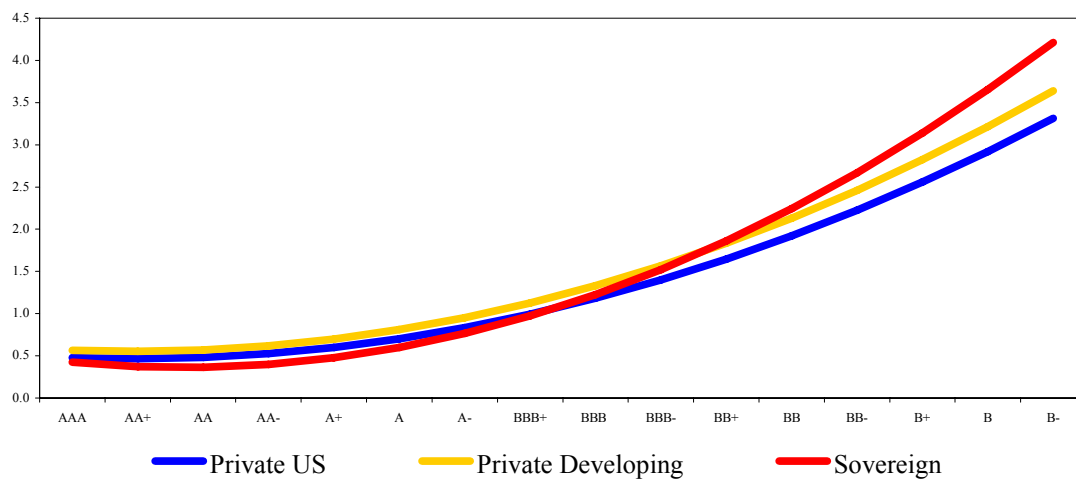
firms rather than bunch up most of a country's firms close to the sovereign level. Thus, the sovereign ceiling would tend to push down the whole scale of private ratings rather than affecting only those firms that are right against the constraint. This may explain why the value of  $\beta_0$  is somewhat lower than one, a value that implies that even those emerging market firms that are not constrained by the sovereign rating receive ratings that are lower than what could be expected if they were located in a country with a AAA-rated sovereign.

## VI. CONCLUSIONS

The persistent impact of sovereign credit ratings on the credit rating of firms that issue bonds in international capital markets has important implications for emerging market economies. It represents an externality that public debt generates on private borrowers, increasing the cost of credit and reducing the volume of private capital flows. A large, risky level results in higher borrowing costs for the private sector. This externality is not widely recognized or discussed in the academic literature or policy circles, but the results in this paper indicate that it is not only statistically robust but also of significant size. At the levels where many emerging sovereigns are rated, the results in this paper imply that a sovereign rating that is a couple of steps lower in the 21-point scale may increase the cost of credit for private borrowers by 50 basis points annually.

Another topic that deserves wider discussion is whether the sovereign ceiling policy, even in a "lite" version, is in need of a new reconsideration. Public defaults do not always spill over to private defaults, and when both happen it is not always the case that private defaults were caused entirely by the sovereign default. Moreover, that exchange controls have been relatively short-lived and limited in recent episodes. This being the case, the penalty imposed on private credit ratings may be excessive. One possible revision of the policy would be to complement measures of default likelihood with measures of expected loss from the default. A healthy firm forced briefly into default by administrative measures may ultimately not result in much of a loss to creditors. The ratings assigned by the agencies, however, merely assess the probability of default and not its likely duration or the extent of the possible ensuing losses. The credit rating agencies could provide more transparent information on what would be the rating given to a private company if it considered that the sovereign was a AAA borrower. This would allow the markets to price risk more accurately than they do today.

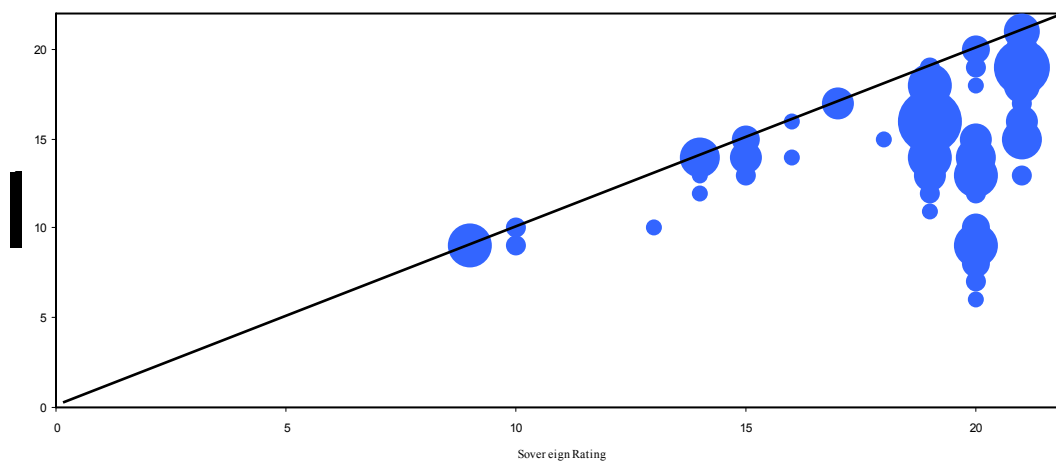
Figure 1. Bond Spread by Credit Rating<sup>1</sup>  
(As of September 1, 2005)



<sup>1</sup> The fitted curves are obtained by quadratic trend.

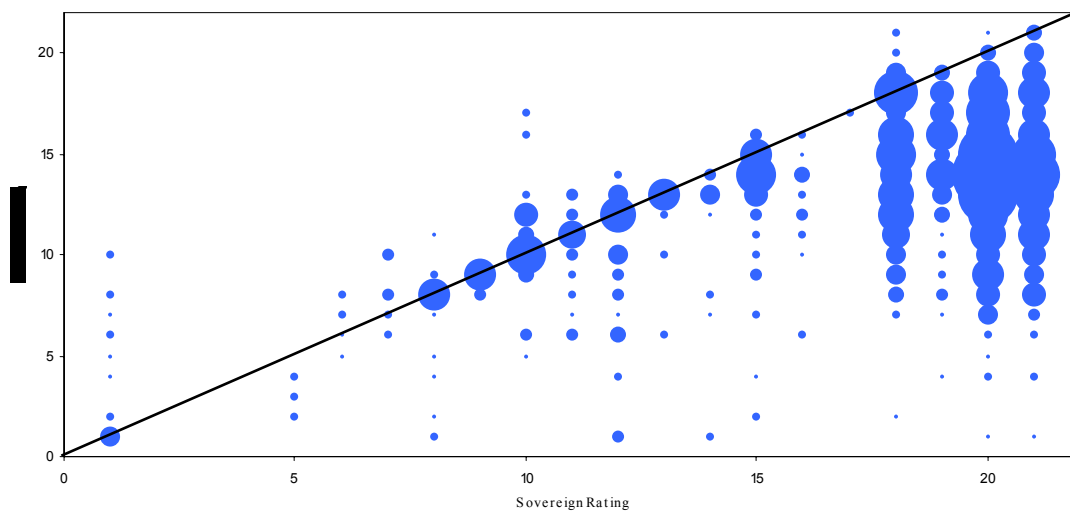
Source: Author's elaboration based on data from Bloomberg and Standard and Poor's.

Figure 2. Credit Ratings, 1995–1996



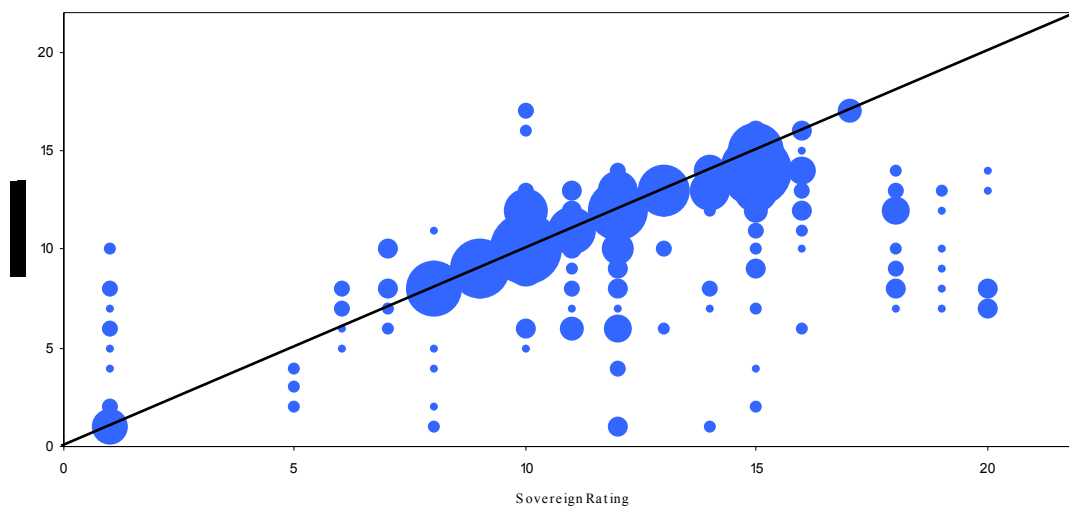
Sources: Bloomberg and Standard and Poor's.

Figure 3. Credit Ratings, 1997–2004



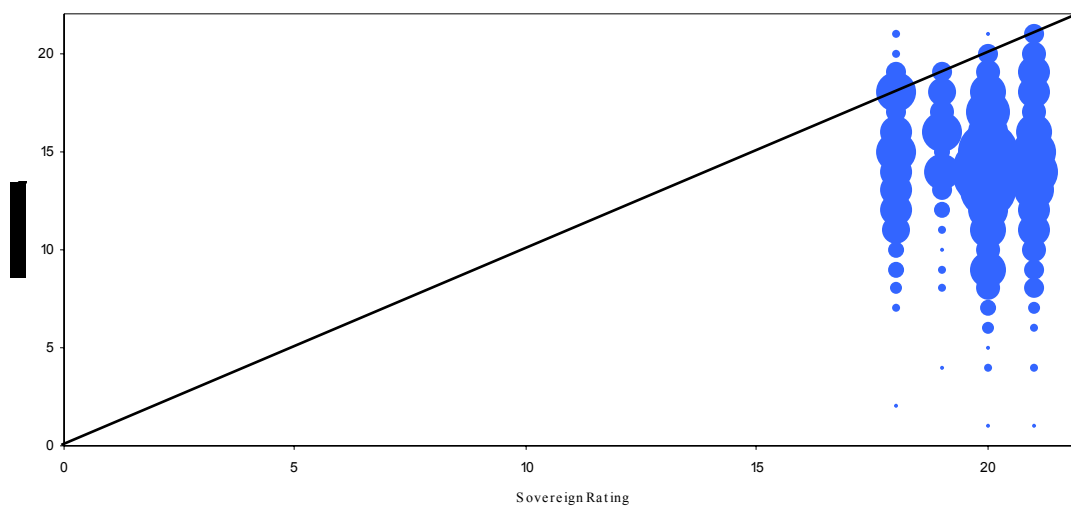
Sources: Bloomberg and Standard and Poor's.

Figure 4. Credit Ratings in Emerging Economies



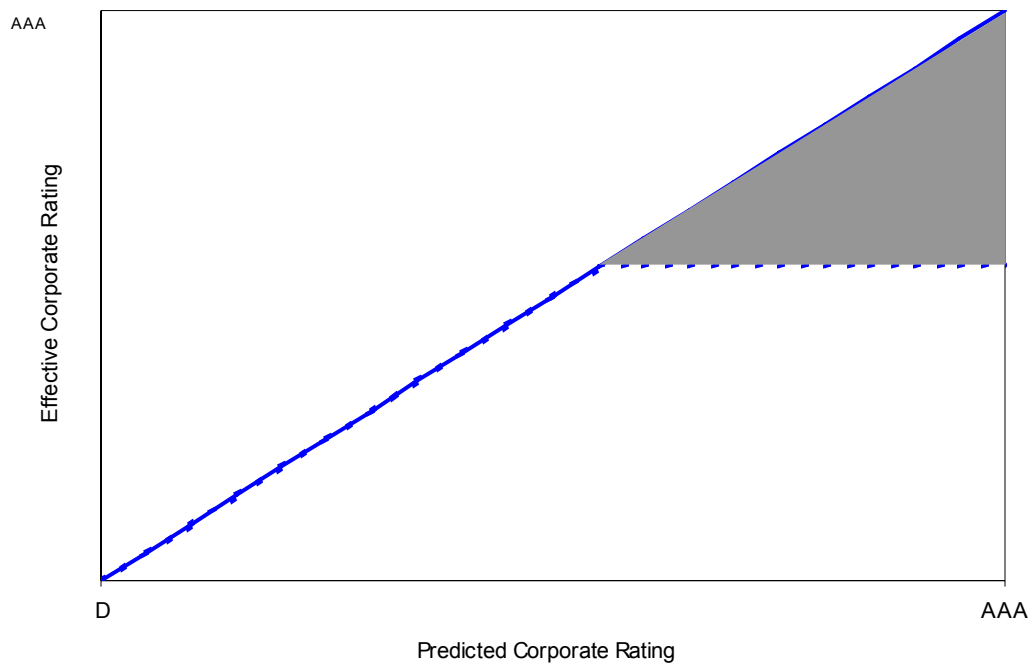
Sources: Bloomberg and Standard and Poor's.

Figure 5. Credit Ratings in Advanced Economies

















Sources: Bloomberg and Standard and Poor's.

Figure 6. Sovereign Ceiling



Source: Authors' calculations.

Table 1. Foreign Currency Sovereign Credit Ratings before Defaults

Country	Year of Default	Rating before Default (1)	
		One year	Two years
<b>Rating Agencies (2)</b>			
Dominican Republic	 2005	3	9
Venezuela	 2005	6	5
Grenada	 2004	9	9
Uruguay	 2003	10	12
Nicaragua	 2003	7	7
Paraguay	 2003	7	7
Moldova	 2002	5	6
Indonesia	 2002	6	2
Argentina	 2002	9	10
Ukraine	 2001	5	6
Indonesia	 2000	5	6
Ecuador	 1999	6	8
Pakistan	 1999	5	8
Russian Federation	 1999	9	9
<b>Institutional Investor (3)</b>			
Jordan	1989	9	9
Paraguay	1986	9	9
South Africa	1985	13	13
Egypt	1984	8	11
Tanzania	1984	4	4
Brazil	1983	12	12
Chile	1983	12	13
Morocco	1983	8	9
Nigeria	1983	12	13
Peru	1983	10	11
Philippines	1983	10	10
Uruguay	1983	10	10
Argentina	1982	13	15
Dominican Republic	1982	7	8
Ecuador	1982	10	9
Mexico	1982	16	17
Panama	1982	10	11
Venezuela	1982	15	16
Pakistan	1981	6	7
Poland	1981	9	12
Romania	1981	12	13

Sources: Authors' calculations based on data from FitchRatings, Institutional Investor, Moody's Investors Service, Standard & Poor's, and Sturzenegger and Zettelmeyer (2005).

Notes:

(1) The rating agencies' and Institutional Investors' scales were converted to a numerical scale from 1 to 21, with 1 being the lowest rating (D), and 21 the highest (AAA). A rating of 11 is the lower bound for "investment grade" status.

(2) Foreign currency rating of long-term debt.

(3) Selected government defaults and rescheduling of privately held bonds and loans from Sturzenegger and Zettelmeyer (2005)

Table 2. Scale of Standard and Poor's Foreign Currency Debt Rating

Interpretation	Rating	Assigned value
INVESTMENT-GRADE RATINGS		
Highest quality	AAA	21
High quality	AA+	20
	AA	19
	AA-	18
Strong payment capacity	A+	17
	A	16
	A-	15
Adequate payment capacity	BBB+	14
	BBB	13
	BBB-	12
NONINVESTMENT-GRADE RATINGS		
Likely to fulfill obligations, ongoing uncertainty	BB+	11
	BB	10
	BB-	9
High-risk obligation	B+	8
	B	7
	B-	6
Currently vulnerable nonpayment obligation	CCC+	5
	CCC	4
	CCC-	3
Highly vulnerable to nonpayment	CC/C	2
Default	SD/D	1

Source: Authors' calculations based on data from Standard and Poor's.

**Table 3. Control Variables for Corporate Ratings**

<b>Concept</b>	<b>ZETA<sup>®</sup> Model Variable<sup>1</sup></b>	<b>Exp. Effect on Corporate Rating</b>
Profitability	EBIT/Total assets	+
	Retained earnings/Total assets	+
Liquidity	Working Capital/Total assets	+
Leverage	Equity/Capital	+
Debt Coverage	EBIT/Interest expense	+
Size	Size Assets	+

<sup>1</sup> See Altman (2000).

**Table 4. Descriptive Statistics of the Variables Used in the Panel Regressions**

	Variables	Industrial Countries		Developing Countries	
		Mean	Std. Dev.	Mean	Std. Dev.
Corporations	Sovereign Rating	19.81	1.02	11.89	3.72
	Corporate Rating	14.4	3.01	10.73	3.22
	EBIT/Assets	7.29	4.79	9.03	5.60
	Retained earnings/Assets	18.31	17.75	17.58	15.73
	Working Capital/Assets	7.22	14.69	5.78	15.54
	Equity/Capital	56.33	21.88	54.82	18.06
	EBIT/Interest expense	6.18	1.42	5.74	1.13
	Size Assets	3.78	1.35	3.28	1.44
	Number of corporations	398		111	
	Number of countries	12		18	
	Observations	1528		579	

Source: Authors' calculations based on Bloomberg.

**Table 5. Determinants of Corporate Credit Ratings**

<b>Dependent variable</b>	<b>(1) Rtg</b>	<b>(2) Rtg</b>	<b>(3) Rtg</b>	<b>(4) Rtg</b>	<b>(5) Rtg</b>
EBIT/Assets	-0.050*** (0.02)	0.046*** (0.01)	0.074*** (0.02)	0.036** (0.02)	0.039 (0.02)
EBIT/ Interes Expense	0.590*** (0.07)	0.360*** (0.06)	0.411*** (0.09)	0.356*** (0.07)	0.584*** (0.17)
Retained Earnings/Assets	0.035*** (0.01)	0.030*** (0.01)	0.024*** (0.01)	0.033*** (0.01)	-0.002 (0.01)
Working Capital/Assets	-0.014** (0.01)	-0.029*** (0.00)	-0.030*** (0.01)	-0.032*** (0.01)	0.008 (0.01)
Equity/Assets	0.013** (0.01)	0.025*** (0.00)	0.021*** (0.01)	0.028*** (0.00)	0.020** (0.01)
Size	0.954*** (0.06)	0.726*** (0.06)	0.704*** (0.05)	1.006*** (0.06)	0.373*** (0.12)
Social and Personal Services	0.106 (0.48)	-1.068** (0.43)	-1.863*** (0.43)	-1.834*** (0.47)	0.000 0.00
Agriculture	-0.845** (0.36)	-0.849*** (0.28)	-0.947*** (0.30)	-2.050*** (0.33)	-0.657 (0.50)
Construction	-0.549 (0.64)	-0.772* (0.41)	-0.120 (0.44)	-1.784*** (0.53)	-1.516** (0.68)
Retail, Trade and Restaurants	-0.536 (0.41)	-0.486* (0.29)	-0.431 (0.33)	-1.432*** (0.36)	-0.194 (0.43)
Manufacturing	0.177 (0.32)	-0.273 (0.23)	-0.389 (0.26)	-1.429*** (0.31)	0.193 (0.23)
Mining	0.043 (0.34)	-0.186 (0.26)	0.147 (0.29)	-1.451*** (0.33)	0.236 (0.40)
Transport and Communication	0.167 (0.33)	0.017 (0.25)	-0.026 (0.28)	-1.165*** (0.34)	0.434* (0.26)
Financing	2.226*** (0.45)	0.586* (0.34)	0.311 (0.37)	-0.307 (0.39)	0.000 (0.00)
Utilities	1.196*** (0.37)	1.213*** (0.27)	0.885*** (0.29)	0.842** (0.34)	0.457 (0.30)
Observations	2107	2107	1588	1528	579
R-squared	0.375	0.746	0.783	0.675	0.782
Dummies Ctr x Time	No	Yes	Yes	Yes	Yes
Sample	Full	Full	Full	Industrial	Developing

**Robust**

standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 6. Impact of the Sovereign Credit Ratings on Corporate Credit Ratings**

Dependent variable	(1) Rtg	(2) Rtg	(3) Rtg	(4) Rtg	(5) Rtg	(6) Rtg	(7) Rtg
EBIT/Assets	0.049* (0.03)	0.016 (0.02)	0.040 (0.02)	0.045** (0.02)	0.010 (0.02)	-0.002 (0.02)	0.015 (0.02)
EBIT/ Interest Expense	0.207 (0.13)	0.371*** (0.10)	0.339*** (0.08)	0.225*** (0.08)	0.409*** (0.14)	0.382*** (0.11)	0.482*** (0.10)
Retained Earnings/Assets	0.040*** (0.00)	0.034*** (0.00)	0.034*** (0.01)	0.033*** (0.00)	-0.002 (0.01)	0.032*** (0.00)	0.032*** (0.00)
Working Capital/Assets	-0.024*** (0.01)	-0.022*** (0.01)	-0.027*** (0.01)	-0.027*** (0.01)	0.006 (0.01)	-0.021*** (0.01)	-0.025*** (0.01)
Equity/Assets	0.026*** (0.01)	0.025*** (0.01)	0.024*** (0.01)	0.035*** (0.01)	0.024*** (0.01)	0.029*** (0.01)	0.023*** (0.01)
Size	0.850*** (0.08)	0.953*** (0.08)	0.815*** (0.09)	1.151*** (0.06)	0.496*** (0.10)	0.948*** (0.08)	0.893*** (0.08)
Inflation		-0.019 (0.02)	-0.060* (0.03)	-0.013 (0.08)	0.005 (0.01)	-0.018 (0.02)	-0.017 (0.02)
Current Account/GDP		-0.115*** (0.03)	-0.183*** (0.04)	-0.188*** (0.05)	-0.040 (0.03)	-0.115*** (0.03)	-0.073*** (0.02)
Growth GDP		-0.011 (0.01)	-0.037 (0.04)	-0.015 (0.02)	0.036 (0.03)	-0.010 (0.01)	-0.016 (0.01)
GDP per capita		-0.304* (0.16)	-0.783*** (0.19)	0.496 (0.52)	0.016 (0.17)	-0.286* (0.15)	-0.143 (0.16)
Industrial		-0.907* (0.47)	0.398 (0.54)			-0.934** (0.44)	-1.317*** (0.39)
Volatility GDP		0.026* (0.01)	0.008 (0.02)	0.144*** (0.04)	-0.005 (0.01)	0.034** (0.01)	0.001 (0.01)
External Debt/Exports			-0.276*** (0.06)				
Sov_Rtg	0.446*** (0.03)	0.597*** (0.05)	0.496*** (0.05)	0.296** (0.14)	0.638*** (0.05)	0.700*** (0.05)	0.735*** (0.11)
Sov_Rtg x 1(Trnsable sector)						-0.201*** (0.03)	
Sov_Rtg (1996)							-0.054 (0.14)
Sov_Rtg(1997)							-0.100 (0.12)
Sov_Rtg (1998)							-0.096 (0.11)
Sov_Rtg(1999)							-0.126 (0.11)
Sov_Rtg (2000)							-0.150 (0.12)
Sov_Rtg(2001)							-0.146 (0.11)
Sov_Rtg (2002)							-0.207* (0.11)
Sov_Rtg(2003)							-0.196* (0.11)
Sov_Rtg(2004)							-0.227** (0.11)
Observations	2102	2032	1369	1525	507	2032	2032
R-squared	0.619	0.655	0.685	0.612	0.661	0.667	0.676
Dummies sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster (Ctr x Time)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Full	Full	Full	Industrial	Developing	Full	Full

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st standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 7. Asymmetries**

	(1)	(2)	(3)
	dRtg	dRtg	dRtg
dSov_Rtg	0.495*** (0.18)	0.235** (0.10)	0.446*** (0.13)
dSov_Rtg x 1(Sov_Rtg - Sov_Rtg_1 > 0)	-0.333* (0.20)		-0.178 (0.13)
dSov_Rtg x 1(Rtg_1 = Sov_Rtg_1)		0.821*** (0.09)	0.686*** (0.11)
dSov_Rtg x 1(Industrial)			-0.413*** (0.11)
Observations	1408	1408	1408
R-squared	0.17	0.23	0.266
Control variables	Yes	Yes	Yes
Cluster (Ctr x Time)	Yes	Yes	Yes
Sample	1997 - 2004	1997 - 2004	1997 - 2004

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 8. Non-linear Specification of Sovereign Ceiling**

	(1) Rtg
$\widehat{Rtg}_{isct}$	0.76*** (0.05)
$(\widehat{Rtg}_{isct} - Sov\_Rtg_{ct})I[\widehat{Rtg}_{isct} \geq Sov\_Rtg_{ct}]$	-0.73*** (0.04)
$I[\widehat{Rtg}_{isct} \geq Sov\_Rtg_{ct}]$	-0.75** (0.36)
Constant	3.16*** (0.62)
Observations	1949
R-squared	0.548

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

### Appendix I. Description of Variables

Variable Name	Definition	Unit of Measurement	Data Sources
Sovereign Rating	Ratings assigned as of June 15 by S&P.	AAA=21;.....D=1	Standard and Poor's
Corporate Rating	Ratings assigned as of June 15 by S&P.	AAA=21;.....D=1	Standard and Poor's
EBIT/Assets	EBIT to total assets	Percent	Bloomberg
Retained earnings/Assets	Retained earnings to total assets	Percent	Bloomberg
Working Capital/Assets	Working capital to total assets	Percent	Bloomberg
Equity/Capital	Equity to capital	Percent	Bloomberg
EBIT/Interest expense	EBIT to interest expense	Percent (in natural logarithms)	Bloomberg
Size Assets	Total assets	Millions of US\$ of 2000 is deflated by the CPI (in natural logarithms)	Bloomberg
Inflation	Annual consumer price inflation rate	Percent	WDI
Current Account	Current account surplus relative to GDP	Percent	WDI
Growth GDP	Annual real GDP growth	Percent	WDI
GDP per capita	GDP per capita	Millions of US\$ of 2000 (in natural logarithms)	WDI
Volatility GDP	Variance 10 year GDP growth	Variance 10 year	WDI
External Debt	External debt to exports	Percent	WDI
Economic development	IMF classification	Indicator variable: 1=developing ; 0=industrialized	IMF

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