DETERMINANTS OF THE SPREAD BETWEEN CORPORATE AND SOVEREIGN DEBT YIELDS IN EMERGING LATIN AMERICA AND ASIA

Abstract

We examine the determinants of the spread between corporate and sovereign debt yields to maturity. We use corporate bond data from 13 Latin American and Asian issuers to calculate the spread between their yields and the respective sovereign debt yields. We found the determinants of such spread, controlling for debt term structure, and other variables. Additionally, we found industry and country effects not explained by variables at firm, issue, country, or international levels. The contribution of this paper consists in that industry effects, as well as country effects, are important explaining spreads after controlling for country and index specific factors.

Keywords: Corporate debt spreads, country risk, industry factors

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1 Introduction

This paper is on the determinants of the spread between the yield to maturity of corporate debt issued by firms from Latin America and Asia against the yield of the respective sovereign debt. This is still a relatively understudied subject, mainly because only during the past decade sufficient emerging corporate debt issues have come to the market to make empirical studies feasible. On the other hand, there exists an extensive empirical literature that assess the determinants of sovereign yield spreads in EMs (spread between sovereign debt yields in non-developed markets, and the yield to maturity of the sovereign debt of a benchmark market, mainly the U.S. for bonds issued in U.S. dollars). Earlier research (Peter & Grandes, 2005; and Briceño & Rivero, 2012) found that the most important determinant of the risk of corporate default for firms from emerging markets is sovereign risk, and that there are also other determinants including firm specific factors.

We use a dataset of corporate and sovereign bonds to study the determinants of these spreads for countries included in the MSCI Emerging Markets Index. Our data on the spread benefits from the use of the Yield Adjusted Spread –YAS, which allows us to control for the term structure of debt. We contribute to the literature mainly by finding that industry effects are more important than country effects as determinants of the spread between corporate and sovereign debt.

The article is organized as follows: the second section reviews the literature. The third section describes the data and the methodologies employed, while the fourth presents the main results and discusses the main findings regarding country and industry effects. The fifth section concludes.

2 Literature review

2.1 Determinants of sovereign spread

In general, the literature on sovereign spreads finds that macroeconomic fundamentals are the most important determinants of such spreads. Along these findings, some researchers also consider country specific factors as being determinants of the spread, as well as fiscal and political factors, investor's risk attitudes or the terms of trade volatility. In this regard, Baldacci, Gupta, & Mati (2008) measure political risk and introduce fiscal variables into a model of spreads for a sample of 30 emerging market economies, and find that fiscal and political factors are the key determinants of country risk premiums. Bellas, Papaioannou & Petrova (2010) find, using data from 14 emerging markets in a panel set from 1997 to 2009, that macroeconomic variables are the main determinants of sovereign spreads in the long-run, but financial volatility is

the main determinant in the short-run. In the same line, Hilscher & Nosbush (2010) studied 32 emerging markets and found the effects of macroeconomic fundamentals on sovereign credit spreads, by using panel data from 1994 to 2007. Volatility of the terms of trade (instrumented with a country-specific commodity price index) and country fundamentals have substantial explanatory power. On the other hand, Ferrucci (2003) shows that in emerging markets, along with macroeconomic factors, external liquidity conditions are also significant determinants of the sovereign spread. Baek, Bandopadhyaya & Du (2005) find that both macroeconomic variables and the risk attitude of the market are significant determinants of sovereign risks. They constructed their own measure called the *Risk Appetite Index* in order to assess the impact of the market attitude toward risk on the Brady bond spread. Their sample included 34 emerging and developed markets in 1992 to 47 in 1996, in an unbalanced panel. Ludgvinson & Ng (2009) studied the impact of macroeconomic factors in a dynamic framework, and found a cyclical behavior of these factors in returns and long-term yield predictions for U.S. T-Bonds.

A recent study by Dahlquist & Hasseltoft (2013) studied the influence of local factors in bond risk premiums across international bond markets by Implementing a dynamic factor analysis (following Cochrane & Piazzesi, 2009) and using a dataset covering monthly zero-coupon interest rates for Germany, Switzerland, the U.K., and the U.S. from January 1975 to December 2009. This study contrasts with Westphalen (2001), who considers that there is a systematic risk factor besides country risk, which they termed ‘sovereign bond market factor’.

In another branch of the literature, sovereign ratings are considered the main determinants of sovereign risk premium (Kaminsky & Schmukler, 2002; Klein & Stellner, 2013; Remolona, Scatigna, & Wu, 2008). In this line, Cantor & Packer (1996) studied the determinants of sovereign credit ratings for 42 developed and emerging countries and found that credit ratings have independent influence on credit spreads and are positively correlated with macroeconomic factors. Martínez, Terceño & Teruel (2013) and Terceño et al. (2013) studied the determinants of the sovereign spread for seven Latin American countries by using a panel data framework. They test for the effects of the international financial crisis in 2008, and found the existence of contagion effects across these markets during such crisis.

2.2 The influence of sovereign risk

Theoretically, according to a string of the literature, private debt should be riskier than sovereign debt. This implies that the credit rating of a sovereign bond issue must be a ceiling for a corporate one issued in the same country (Cuadra, Sanchez, & Sapriza, 2010). However, existing evidence suggests that this is not always true in the bond markets (Durbin & Ng, 2005). According to Borensztein, Cowan, & Valenzuela (2006), before 1997 no credit rating agency gave higher ratings to corporate issues than to the respective sovereign debt issues; this practice was termed the ‘sovereign ceiling’. But these authors stated that as an accepted policy this was relaxed in 1997. In fact, Lee, Naranjo & Sirmans (2013) studied 2,364

companies in 54 countries during 2004-2011, and observed that violations to this practice are found in countries with stronger institutions and with markets having better disclosure rules.

Borensztein, Cowan, & Valenzuela (2006) employed a panel dataset of 123 banks from 32 countries from 1995 to 2004 and found that public debt affects the private sector because sovereign ratings are one of the main determinants of the ratings assigned to corporate debt. For Cáceres, Guzzo & Segoviano (2010) the sources of risk have changed from global risk aversion to country specific factors, on the contrary to those stated by Whestphalen (2001). They used data from 10 euro sovereign markets from mid-2005 to 2010. This argument is particularly important for this research due to the main objective to find country and industry risk determinants. Christopher, Kim & Wu (2012) studied 19 emerging markets from 1994 to mid-2007 in a panel data framework, and considered the effect of sovereign rating changes on bonds and stocks. They find that there is a contagion effect regarding changes in sovereign debt ratings in the regions studied; and that this effect does not seem to occur with stocks, since there is a capital migration to the neighborhood when a country is downgraded.

Ağca & Celasun (2009) argue that an increase in public debt affects the private sector by increasing the risk of the country, which makes the private sector less attractive to foreign creditors. This is more critical in countries with scarce creditor rights. They observed syndicated loans from 38 emerging markets and applied a panel data framework from 1990 to 2006. On the other hand, Celasun & Harms (2011) assess the influence of corporate debt on the probability that any country defaults. They found that the higher the proportion of private debt in a country, the lesser the probability that the country will default. In both cases the conclusions lead to an argument on the importance of the management of public debt. Their data set covers 65 developing countries and emerging markets for the years 1980 to 2005. In the subject of sovereign debt, there is a review by Panizza, Sturzenegger, & Zettelmeyer (2009), where authors find more relevance in theories treating the sovereign debt management from a country specific perspective (institutions) than from a global point of view (enforcement).

We can summarize the literature on the influence of sovereign over corporate debt in two main ways: on one hand, credit ratings of sovereigns affect corporate debt issues directly, something that is in line with the previous section summary. On the other hand, the amount of public debt increases the country risk.

2.3 Spread between Corporate and Sovereign Debt

As we explained before, there are several papers based on the theory of the sovereign ceiling. From this perspective, researchers have tried to test whether the yield of the sovereign debt of a certain country against a benchmark affects corporate spreads. Findings in the literature on corporate yield spreads have sparked a discussion regarding the determinants of such spread. In spite of the increasing research efforts on this issue, those findings are still not conclusive. Several papers have focused on the spreads in emerging markets (Peter & Grandes, 2005; Durbin & Ng, 2005; Cavallo & Valenzuela, 2010;

Grandes, Panigo & Pasquini, 2010) without a final word on the matter of what are the determinants of the spreads. Moreover, the literature from developed markets also enters in the debate with contradictive results (Elton, Gruber, Agrawal, & Mann, 2002; Durbin & Ng, 2005; and King & Khang, 2005). On one hand, Elton et al. (2002) found that corporate spreads are explained by three main factors: the expected default losses, local and federal taxes, and a risk premium due to the systematic risk. They find that credit ratings only explain a small fraction of the spread; and that the systematic risk is the same as in the stock market. However, regarding this latter factor, King & Khan (2005) argue that the Elton et al. work fails in the model specification and conclude that the systematic risk has a limited explicative power on the spread. On the other hand, Durbin & Ng (2005) show that corporate risk is positively correlated with sovereign default risk. Additionally, they found weak evidence on the industry factors affecting the corporate spread. Their data consists of 116 corporate (with sovereign counterpart) bonds from 14 emerging markets, from 1995 to 2001.

Cavallo & Valenzuela (2010) employ firm specific, country specific and industry specific variables for 139 corporate bonds in 10 emerging markets. They used the Option Adjusted Spread data from Bloomberg in a panel data framework, between years 1999 to 2006. The authors decompose the variance and find that firm specific factors represent the biggest fraction of the overall variance. In the same line, Klein & Stellner (2013) found a similar behavior, by using credit ratings and zero volatility spreads, for 11 European countries. On the contrary, Peter & Grandes (2005) and Grandes et al. (2010) argue that the sovereign risk is the most important determinant of the corporate spread. In the first work (2005) they employ seven corporate bonds from South Africa, and in the second paper they used information on Latin American Corporate Bonds, for the same countries in our sample, plus Venezuela, from 2006 to 2009. They also test for the sovereign ceiling rule application and found up to 90% of rejection to the rule. Jaramillo & Weber (2013) used a sample of local bonds and found that fiscal variables affect bond yields depending on the global risk aversion. They constructed an unbalanced panel dataset of monthly observations for 26 emerging economies between January 2005 and April 2011.

As stated before, results are different depending on the sample and the period considered. Some of these works' contentions refer to the sovereign risk as the main determinant of corporate spreads. On the other hand, others state that firm specific factors are the most important determinants. What is remarkable for our objective are the findings of Durbin & Ng (2005), which point out that there are not specific industry (sector) factors determining the corporate spread, since we are trying to test whether, effectively, such specific factors actually do exist.

2.3.1 A note on the corporate-sovereign debt spread estimation

The majority of the papers use a matching methodology to estimate spreads. Bonds are selected and matched by using the maturity date. Authors search for bonds, which have similar maturities and are classified in the same risk category. In this form, the spread is calculated by comparing bonds with similar characteristics. However, this matching of similar bonds does not control for the influences of the coupon rate and the term structure of the debt over the spread. The spread must be calculated as the difference between the yield to maturity of a zero coupon corporate bond, and the same measure for a sovereign one (Duffie & Singleton, 1999; Elton et al., 2002). By calculating the spread as the difference between the spot rates, one avoids any potential bias of the risk related to coupons.

In order to control for the term structure of debt, Cavallo & Valenzuela apply the Option Adjusted Spread Analysis – OAS[1] (Miller, 2010). This analysis allows calculating the spread by using an embedded options approach and controlling for potential pre-payments or changes in interest rates. Even though the literature regarding country risk is extensive, it does not present a unique result or theory on the determinants of such risk. Currently, there does not exist a consensus regarding the inclusion of country risk premiums in the valuation of debt instruments. Recently, Garay et al. (2014) found that there are some country and industry effects, not satisfactorily explained in the current literature on the treatment of country risk in a firm's cost of equity valuation. In the literature related to country risk adjustments to valuation models, it is assumed that country risk is explained by the spread of a sovereign debt from another sovereign debt that is risk free. We argue that another important source of country risk could be found from the spread between corporate and sovereign debt.

3 Data and methodology

We consider the emerging markets included in the MSCI Emerging Markets. Its constituents are currently 21 countries: 5 from Latin America, 8 from Asia, 5 from Europe and 3 from Africa. We include all the countries belonging to this Index between the first quarter of 2004 and the last quarter of 2013 (see table 1). We first consider only those corporate bonds that have been issued in U.S. dollars, to allow for direct comparisons. We then proceeded to use only those bonds without special redemption covenants (e.g. callable, sinkable) or variable coupons (e.g. index-linked). We retrieve the data of sovereign and corporate bonds from Bloomberg. We employed the Yield Adjusted Spread (YAS) analysis. YAS allows to value a fixed income security based on market data and calculates the spreads to a benchmark issuing or benchmark curve. This tool interpolates the spread against a benchmark curve of a selected corporate bond, and thus provides standardized

[1] OAS analyzes bonds cash flows with the market's interest rates and with the values of the embedded options against the market volatility.

results. By using the YAS approach to calculate the spread we avoid the problems of matching bonds in the countries of our sample. Previous works have presented problems in matching bonds, due to the scarce number of issues in emerging markets, and the low probability to find instruments with similar maturities in the same risk category (Peter & Grandes, 2005).

We discarded those markets with scarce corporate bonds and missed information on the spread. Furthermore, we filtered the data and dropped outliers[2]. We ended up with 339 corporate bonds from 13 emerging markets (see table 1).

We retrieve information on the benchmark spread and on the sovereign debt spread, starting in 2004 and ending in 2013, using quarterly frequency. Benchmark spread is calculated as the difference between the yield to maturity of a corporate bond and the yield to maturity of a benchmark bond[3], i.e. an automatically selected risk-free bond (usually an U.S. T-Bond with similar time to maturity). The sovereign bond spread is the difference of the sovereign curve (provided by Bloomberg) and an automatically selected risk-free bond used as a benchmark. Additional information related to the issuer features, country's macroeconomics variables and other control variables, was retrieved from Datastream, for the same period.

3.1 Variables

Using information on corporate and sovereign spreads, we calculate the Net Spread as the difference on the benchmark spread and sovereign spread in the point to maturity. When calculated, the effect of the risk-free benchmark is eliminated and we therefore deal with the net spread between the corporate bond and its respective sovereign curve. This is our variable of interest in the regressions that we use later. Descriptive statistics indicate that the average of the net spread is around 338 basis points (b.p.). This variable exhibits a large standard deviation for pooled data, of 219 b.p.; and it is similar to "between" standard deviation (of 210 b.p.), in contrast with "within" standard deviation (of around 60 b.p.)

From the descriptive statistics, it is interesting that we find negative minimum values, which indicates that some of the corporate bonds in our dataset do not accomplish the 'sovereign ceiling rule'; specifically in the case of Chile. Furthermore, some of the bonds show spreads of more than 1,000 b.p.; a large number that reflects deep differences in terms of the risks faced by investors, which were found for debt issued from Argentina and China. Results are separated by country to have a more complete idea of our data set (see table 2a). We also separated the data by industry and results do not show large differences in average, but high variability between sectors (see table 2b). The largest spreads are from the financial and utilities sectors, where maximum spread values are higher than 1,000 b.p. In general, the average net spread tends to decrease towards the end of our time span (see figure 1). Peaks are observed during 2007 to 2008, at the time of global financial crises.

[2] We first dropped extreme values (those with spreads greater than 4000 b.p.) and then decided to drop those bonds with net spreads greater than 2.5 times the standard deviation from the mean.
[3] YAS automatically selects the benchmark that better fits the term structure of a corporate bond.

When net spreads are plotted by country we find that differences are remarkable. Colombia and South Korea exhibit the lowest variances, while Argentina and China show the highest spreads volatilities (see figure 2). In general, when plotted, the net spread exhibits a high volatility, particularly after the global financial crises (i.e. after 2008). This contrasts with results shown in figure 1 regarding a decrease of the net spreads.

3.2 Model

Our model uses as dependent variable the Net Spread and as independent variables a set of characteristics of the issue, the issuer, macroeconomic fundamentals and international controls, following the literature related with this study (Cavallo & Valenzuela, 2010; Grandes et al., 2010). The model is defined as follows:

$$NS_{it} = \boldsymbol{\beta}\vec{F}_{it} + \boldsymbol{\gamma_1}\vec{B}_{it} + \boldsymbol{\gamma_1}\overrightarrow{BF_i} + \boldsymbol{\delta}\vec{C}_t + \boldsymbol{\omega}\vec{G}_t + \varepsilon_{it}$$

Where: $\vec{F}$ is a vector of firm (issuer) time variant characteristics, $\vec{B}$ is a vector of bond (issuing) time variant and $\overrightarrow{BF}$ time invariant bond characteristics, $\vec{C}$ represents country specific macroeconomic variables, and $\vec{G}$ is a vector of global controls.

The vector of firm specific characteristics $\vec{F} = \{DY, LEV, GRW, ROE, SIZ, EV\}$. The variables are DY: dividend yield, measured as the cash dividend of the previous year divided by the firm's stock price at the beginning of the previous year; LEV: leverage, measured as total debt over total assets of the previous year; GRW: is a growth measure, obtained as the DPS previous 5 year's growth provided by Bloomberg; ROE: return on equity, measured as net income over average equity during the period; SIZ: measured as the logarithm of firm's market capitalization in order to control for the size of the firm, and EV: equity volatility measured by the stock price volatility of the previous year.

The vector $\vec{B} = \{TM, MHR, LEV \times TM\}$, where TM: is the time to maturity, measured in years; MHR: is the historical Moody's rating, as reported by this credit rating agency and obtained from Bloomberg; and (LEV×TM) is an interaction of Leverage and Time remaining to maturity designed to control for the risk effect due to longer maturities, but depending on the leverage level of the firm, in the same line of Cavallo & Valenzuela (2010). The vector $\overrightarrow{BF} = \{MOD, AMM\}$, where MOD: is the initial Moody's rating by the time of the issue date; and AMM: is the logarithm of the debt amount issued.

A set of country specific variables $\vec{C} = \{LGTPD, BFR, CBR, CPI\}$, includes the LGTPD: the effect of public debt, measured by the logarithm of total government debt of the previous year; BFR: Bloomberg's financial country risk, which is an index of financial risk developed by Bloomberg that assigns a score to a country depending on its particular financial risk[4];

[4] We also attempted to test our results by using a different measure of financial risk employing the EMBI Plus Index. Unfortunately, some countries are not included in the JP Morgan database for public access. Consequently, we cannot use this measure as a reliable test.

CBR: central bank interest rate of the previous year; CPI: cost price index of the previous year. And the global factors are defined by the vector $\vec{G} = \{VIX, USCRV\}$, where VIX: Chicago Options Exchange volatility index of the previous year; USCRV: is the historical yield of the U.S. sovereign curve 10 years of the previous year. In order to find country and industry effects, we use a set of categorical variables by country and industry.

4 Results and Discussion

We start our analysis with more than a single specification, by using a model with an incremental level of variables to control for the different characteristics described above, as suggested by Cavallo & Valenzuela (2010). We run an OLS Pooled regression, to find statistical significance in our set of variables (see table 3). Results from the regression on the firm specific factors in column (1) are only statistically significant for Leverage, Size and Equity Volatility. Size and equity volatility yield the expected sign, since greater size seems to reduce the default risk, then the negative sign implies a decrease in the spread, while equity volatility is a synonym of greater risk. Leverage, statistically significant at 5%, is almost zero in magnitude. However, it changes with different specifications, perhaps due to the unbalanced nature of the panel. Meanwhile, results for Volatility of Equity and Size are in the same line of the results from Cavallo & Valenzuela (2010).

When issue factors are included in column (2), most of the variables are statistically significant, and results are as expected, except for equity volatility. As observed, this coefficient becomes negative, which is unusual, since equity volatility should increase the net spread and not the other way around. As this is a simple OLS regression, some problems related with the strongly unbalanced characteristic of our panel may explain the counterintuitive results (we consider this problem later). The larger effect is for the amount of the issue. It seems like the amount issued is a signal because when it increases marginally, the net spread diminishes. Size and dividends are not statistically significant.

In column (3) we find the effect of macroeconomic variables. Here, most of the variables are also statistically significant. The most remarkable fact is that the marginal increase in total public debt has a negative effect on the net spread. This should be not only due to a riskier public debt that increases the government spread, but also because it could increase the appetite for private instead of public debt. It would indicate that when a country increases public debt, corporate debt becomes more attractive for investors and there is a perception of lower default risk, because the market penalizes more strongly an increase in government's default risk after the 2008 global financial crises (Schuknecht, Hagen, & Wolswijk, 2010). Furthermore, while equity volatility losses significance, dividends become significant.

The last column, number (4), is very similar to column (3). However, neither the volatility index, nor the U.S. bonds yield curve is statistically significant in this model. This would indicate that local and specific characteristics are more important than international market variables. For Longstaff, Mithal & Neis (2005) the determinants of corporate spreads are mostly country macroeconomic factors and other characteristics not related with the international volatility of markets. According to Jaramillo and Weber (2013), the effects of global factors on spreads differ between countries and depend on variables such as risk aversion. Nevertheless, as our dataset is organized in a strongly unbalanced panel, this imposes the necessity to find consistent and efficient estimators, as suggested by Baltagi (2008). We employ different specifications for unbalanced panel data (see table 4).

There are several differences between pooled and fixed effects estimators. Size, time to maturity and Equity Volatility increases their magnitude, while public debt, financial risk and central bank rate decrease. Random effects estimations obtained by different methods yield similar results. According to them, the highest effect on the net spread is given by the debt amount issued. The greater the debt amount issued, the lower the spread; this could be interpreted in two counter ways, according to Laajimi (2012): i.e. more debt issued increases the bankruptcy costs, but at the same time it increases tax shields, what would be the intuition behind our finding. This argument is reinforced by the leverage coefficient, which is positive and statistically significant. In the same line, time to maturity increases the spread, in line with findings of Leland & Toft (1996). Finally, from significant variables, the equity volatility also has a positive effect; this result is intuitive since the higher the risk the higher the spread. The rest of the variables have smaller coefficients.

We applied tests for model fitting, the Breusch-Pagan LM test is 2.67 indicating that a pooled regression is not recommended. Then, we applied the Hausman test based on the contrast between fixed effects and random effects estimations, obtaining a yield for the χ^2_{15} statistic of 76.36, which indicates that we should use a fixed effects specification model. Finally, given that a fixed effects model is recommended, we run a modified Wald test to check for the presence of heteroskedasticity. We found a χ^2_{82} statistic of 44500 which indicates the presence of heteroskedasticity, and proceeded to run robust regressions to correct for heteroskedasticity by using the Huber/White estimators (Huber, 1967; White, 1980).

We run our fixed effects model. However, this model does not allow observing the time invariant variables influence on the dependent variable. In order to circumvent this problem we run a Fixed Effects vector decomposition (Greene, 2011), to estimate those effects. In our dataset, time invariant variables are the debt amount issued and the Moody's initial rating of the issue. We compare the results for maximum likelihood random estimation (REML) with fixed effects estimators (see table 5). The reason is that Baltagi (2008) recommends REML for strongly unbalanced panels.

From the last specification (i.e. FEVD) it is possible to observe the effects of time invariant variables. The variable Moody's initial rating has a large statistically significant and negative effect on the spread, as expected. Furthermore, the amount issued is also significant but with a positive effect. This latter result is more intuitive since a greater debt amount issued increases the risk of corporate debt. As observed, the largest coefficients are positive for the amount issued and the time to maturity. On the contrary, Moody's initial rating has a large negative effect on the spread, as well as the marginal changes in the total public debt. This latter is expected since the country risk directly influences the spread. In spite of being near to zero, the effect on the spread due to dividend growth is negative. If this growth is associated as a proxy with the growth of Free Cash Flow, and its availability, this sign must be related with the agency problem pointed out by Jensen (1986). On the other hand, size has a positive sign indicating that larger firms are riskier, in contrast with Harris & Raviv (1990), for whom the cost of debt is independent of firm size.

A lower effect for financial risk reflects that, when financial risk increases, it causes an increase in the net spread, but it is minimum (one additional point of financial risk just increases the net spread in 0.20 b.p.). The interaction between time to maturity and leverage yielded statistical significance, as found by Cavallo & Valenzuela (2010). Finally, our regression reflects different effects of international volatility and U.S. 10 year bond yields. On one hand, international volatility (VIX) has a positive effect, yet almost zero. On the other, U.S. 10 year yields have a negative and statistically significant effect on the spreads. This result has the same sign as that obtained by Cavallo & Valenzuela (2010), though its magnitude is somewhat lesser.

Next, we run a regression with dummy variables by country and industry, in order to test for the effects not included in the coefficients explained above (see table 6). Results are important because most of our variables loss statistical significance. Only the time to maturity, the Moody's rating, the amount issued and the financial risk remain significant. It seems that most of the effects are absorbed by the dummy variables. Nonetheless, what is remarkable is the change on the sign for the amount issued. This negative effect could be related with the above stated argument on the signaling through debt. The more debt issued, the better signal to the market, in the same line as Ghosh, Nag & Sirmans (2001). As explained before, this anomaly could be present due to fixed effects not treated in the unbalanced panel. However, we propose a robustness check to fix this problem. We obtained results different from zero and statistically significant for only two of the countries of our sample; meanwhile, four of the industry sectors yielded significant results. Only Indonesia and Mexico yielded coefficients which were statistically significant at 5% and 10% levels, respectively. In the case of the industry sectors, financial, consumer goods, utilities and communications & technology, are statistically significant. The intercept captures the dummy effect for Turkey and the diversified sector, and it is statistically significant.

4.1 Robustness checks

We first run an F-test in order to establish that our dummy variables are statistically different from zero. Results, available upon request, indicate that at least one of them is actually different from zero. As we are trying to find specific country and industry effects not explained for the selected variables in our model, it is possible that such effects would be explained by omitted variables. We then included variables to control for country and industry effects. We retrieved the data on the MSCI stock market indexes for each of the countries in our sample, with the same time frequency and on the period considered; as well as for the MSCI Emerging Markets industries. We then run our regression including those two controls to find potentially omitted effects in the previous analysis. Results, available upon request, contrast with previous regressions with dummy variables but not specific country and industry controls. First, some variables not only change in magnitude, but also become statistically significant. This is the case for dividend yield, size and the central bank rate. Second, the amount's coefficient becomes positive. The most influential variables on the net spread in previous regressions were the amount issued and the time to maturity. In this regression the time to maturity gains statistical significance.

In the case of firm size, marginal increments on the market capitalization of a firm increase its net spread. As stated by Elton et al. (2002), as the spread is affected by the same factors that affect the systematic risk in the market, it would be assumed that larger firms should be less risky, in the line with Fama & French (1993, 1995, 1996). Yet, the positive sign obtained here, could indicate signaling problems, related with agency problems derived from the larger size of firms (Jensen & Meckling, 1976). On the other hand, increments in dividend yields imply increments in spreads, but not in the same proportion. This result is as expected, since greater dividends trigger higher default risks. As expected, Moody's initial rating is a statistically significant determinant of the spread. If a rating is higher, the spread will diminish. This is similar to the arguments given by Borensztein et al. (2006), for whom rating agencies influence the corporate spreads, which are determined by sovereign spreads at the same time.

An interesting result is that the local index and the Industry index show statistical significance. Moreover, the inclusion of such indexes carries a loss of statistical significance for country macroeconomic variables. It is the case of the central bank rate and the cost price index. In previous regressions we observed, with dummy variables, that industry effects are more important than country effects, not only in magnitude, but also in statistical significance. However, by using country and industry controls, this difference is not as easy to test. Then, we run a regression with interactions between our most influential variable in the regression, the amount issued, with some country and industry variables, in order to find some differences in the forms that this variable affects corporate issues in different countries or even different industries. Results, available upon request, show that the effect of the amount issued varies between countries and industries. For this test, we

selected arbitrarily the countries and industries whose dummy variables were statistically significant in the previous regression. However, only the interaction with Mexico resulted statistically significant, though only at the 10% level. Meanwhile, three of four interactions with specific industries were highly significant. This would indicate that industry effects are more important than country effects.

5 Conclusions

Country risk is an important decision variable when investors search for investments in emerging markets. We find that variables related with firm specific factors and macroeconomic fundamentals are determinants of the net spread between the yield to maturity of a corporate bond and the yield to maturity of a sovereign bond from the respective country. The dataset and the model we employ show that country and industry specific variables persist after controlling for other factors, suggesting the need to specifically include these effects when studying country risk.

It has been shown that fiscal and monetary policies aiming at improving the financial health of a country are mechanisms capable to cause a reduction in country risk, since better ratings and lower financial risk, impact positively private debt issues (Afik & Benninga, 2014; Jaramillo & Weber, 2013). Moreover, Caceres, Guzzo & Segoviano (2010) consider that an appropriate sovereign balance sheet management diminishes the sovereign risk. They entail a better public debt management, positively affecting private firms. However, when country and industry specific controls are included (e.g. specialized market indexes) such controls absorb part of the effects that firm characteristics and macroeconomic variables do not capture. In spite of this fact, it remains part of the specific country and industry effect, not completely explained as shown here. Moreover, it seems that industry effects are more important than country effects. The latter are absorbed almost totally by the industry index control variable. Meanwhile, the industry effect does not disappear when controlling using a specialized index. This contrasts with findings in related literature, in which country effects are larger than industry effects (Ye Bai, Green, & Leger, 2012; Heston & Rouwenhorst, 1995; M.-H. Lee & Hooy, 2013); but it is in line with other literature where industry effects prevail over country effects (Y. Bai, 2014; Eiling, Gerard, & De Roon, 2012; Ferreira & Ferreira, 2006).

We contribute to the literature in this subject as we find that there are some country, and mainly industry effects, that are statistically significant in determining corporate over sovereign debt spreads. This finding is contrary to the argument presented by Durbin & Ng (2005). These findings are important not only by the contrast with a branch of the literature in country and industry effects, but also in assessing country risk from the corporate yield spread. We also contribute to practitioners investing in corporate debt in emerging markets. They are advised to take into account that these investments

require a deeper analysis on the specific industry and country conditions regarding such investments. Issuers should incorporate these sources of risk when evaluating issuing bonds.

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Table 1. Number of bonds included by country.

It includes matured and active bonds from the first quarter of 2004 to the last quarter of 2013.
Note: we included individual bonds, no matter if the same firm issued two or more of them.

Country	Argentina	Brazil	Chile	China	Colombia	Indonesia	Korea	Mexico	Malaysia	Peru	Philippines	Thailand	Turkey	**Total**
Number of bonds	11	64	24	18	20	16	48	52	15	18	13	14	26	**339**

Table 2. Panel A. Descriptive statistics by country

Net spread by country in basic points from 1Q-2004 to 4Q-2013

Country	**Observations**	**Mean**	**SD**	**Min**	**Max**
Argentina	285	752.74	206.94	106.65	1044.50
Brazil	1307	419.93	151.98	60.86	788.51
Chile	553	169.89	291.58	-254.09	639.93
China	210	568.17	372.99	58.37	1141.77
Colombia	292	252.17	58.70	69.93	433.81
Indonesia	355	479.05	161.96	75.70	777.69
Korea	737	187.29	99.95	3.21	434.39
Mexico	1131	247.28	141.28	0.70	793.30
Malaysia	446	308.29	124.50	65.08	520.01
Peru	313	424.11	148.60	109.76	733.82
Philippines	223	343.39	161.74	16.312	574.51
Thailand	422	339.63	162.64	90.27	632.45
Turkey	282	303.02	55.34	142.38	428.90

Table 2. Panel B. Descriptive statistics by industry

Net spread by industry in basic points

Industry	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
Financial	2083	406.68	254.05	-254.09	1141.77
Basic Materials	922	308.92	158.22	-170.44	741.09
Industrial	76	385.45	165.52	88.95	628.62
Consumer Goods	742	316.54	268.83	-248.03	793.30
Energy	523	318.32	170.13	75.69	777.69
Utilities	965	325.64	219.16	-251.17	1010.35
Communications & Tech	1197	264.40	127.10	0.70	593.14
Diversified	48	423.59	140.76	79.40	507.79

Table 3. Determinants of Net Spread

This is a Pooled OLS regression with dependent variable as the Net Spread (in bp). Each column represents a particular specification for: 1) firm specific factors, 2) firm and bond specific characteristics, 3) firm and bond specific characteristics plus country particular macroeconomic and risk features, and 4) all described characteristics plus global factors. Data from 1Q-2004 to 4Q-2013

Legend: * p<0.10; ** p<0.05; *** p<0.01 (*t* statistics in parentheses)

	Firm	**Issue**	**Macro**	**International**
Dividend Yield	-0.28	-1.19	-3.54**	-3.69***
	(-0.39)	(-0.93)	(-2.54)	(-2.63)
Leverage	-0.54**	6.45***	5.89***	6.15***
	(-2.50)	(-8.5)	(-7.14)	(-7.42)
Growth	0.02	0.27*	-0.18	-0.2
	(-0.29)	(-1.8)	(-1.03)	(-1.14)
ROE	-0.22	3.07***	1.98***	1.98***
	(-1.15)	(-7.07)	(-3.4)	(-3.35)
Size	-23.68***	1.67	-2.61	-2.87
	(-23.11)	(-0.97)	(-1.26)	(-1.38)
Equity Vol	8.77***	-2.65***	0.38	0.11
	(-22.38)	(-3.75)	(-0.46)	(-0.13)
T. Maturity		11.78***	10.67***	11.47***
		(-4.21)	(-3.45)	(-3.71)
Moody's History		-1.48***	-1.30***	-1.41***
		(-4.24)	(-3.33)	(-3.59)
(Lev)(T. Mat)		-0.52***	-0.48***	-0.51***
		(-5.39)	(-4.40)	(-4.71)
Moody's initial		-4.94***	-7.93***	-7.85***
		(-6.24)	(-8.60)	(-8.52)
Amount		-50.13***	-21.68**	-19.86**
		(-5.93)	(-2.19)	(-2.01)
Public Debt			-10.40***	-10.29***
			(-3.08)	(-3.00)
Financial Risk			1.12***	1.22***
			(-4.78)	(-5.14)
C. Bank Rate			13.08***	13.57***
			(-4.8)	(-4.83)
CPI			-12.57***	-12.66***
			(-5.25)	(-5.26)
VIX				-0.72
				(-1.54)
US 10y Yield				8.47
				(-1.23)
Intercept	-0.28	-1.19	-3.54**	-3.69***
	(-0.39)	(-0.93)	(-2.54)	(-2.63)
Observations	4718	1024	754	754
Adjusted R^2	0.29	0.31	0.47	0.47
F Test	317.89	42.48	44.65	40.01
RMSE	175.33	120.04	107.92	107.6

Table 4. Specifications recommended for unbalanced panel

Dependent variable is the Net Spread (in b.p.). Each column represents a particular specification for unbalanced panels: 1) Pooled OLS, 2) fixed effects, 3) random effects, 4) maximum likelihood RE, 5) Swami Arora estimator, and 6) Minimum Variance Quadratic Unbiased Estimators. Data from 1Q-2004 to 4Q-2013

Legend: * p<0.10; ** p<0.05; *** p<0.01 (*t* statistics in parentheses)

	OLS	**FE**	**RE**	**REML**	**SA**	**MX**
Dividend Yield	-3.69***	0.53	-0.12	0.01	-0.16	-3.69***
	(-2.63)	(-0.42)	(-0.09)	-0.01	(-0.12)	(-2.66)
Leverage	6.15***	3.17***	2.86***	2.96***	2.82***	6.15***
	(-7.42)	(-4.41)	(-4.23)	(-4.42)	(-4.17)	(-7.51)
Growth	-0.2	-0.28**	-0.24**	-0.25**	-0.24**	-0.2
	(-1.14)	(-2.47)	(-2.12)	(-2.25)	(-2.08)	(-1.15)
ROE	1.98***	-0.35	-0.14	-0.22	-0.11	1.98***
	(-3.35)	(-0.80)	(-0.34)	(-0.54)	(-0.27)	(-3.39)
Size	-2.87	16.79**	1.46	3.68	0.87	-2.87
	(-1.38)	(-2.23)	(-0.31)	(-0.71)	(-0.19)	(-1.40)
Equity Vol.	0.11	3.88***	4.66***	4.62***	4.66***	0.11
	(-0.13)	(-2.89)	(-4.39)	(-4.32)	(-4.42)	(-0.13)
T. Maturity	11.47***	28.42***	23.66***	25.35***	23.03***	11.47***
	(-3.71)	(-10.19)	(-8.87)	(-9.47)	(-8.62)	(-3.75)
Moody's History	-1.41***	0.68**	0.32	0.44	0.27	-1.41***
	(-3.59)	(-2.02)	(-0.95)	(-1.35)	(-0.81)	(-3.63)
(Lev)(T. Mat)	-0.51***	-0.51***	-0.45***	-0.47***	-0.44***	-0.51***
	(-4.71)	(-6.24)	(-5.56)	(-6.00)	(-5.41)	(-4.77)
Moody's Initial	-7.85***	.	-10.04***	-10.68***	-9.85***	-7.85***
	(-8.52)	.	(-6.02)	(-5.50)	(-6.18)	(-8.62)
Amount	-19.86**	.	-114.91***	-120.09***	-113.09***	-19.86**
	(-2.01)	.	(-4.54)	(-3.96)	(-4.72)	(-2.03)
Public Debt	-10.29***	-27.25	-16.44**	-16.28**	-16.52**	-10.29***
	(-3.00)	(-1.53)	(-2.34)	(-2.02)	(-2.45)	(-3.04)
Financial Risk	1.22***	0.39***	0.42***	0.42***	0.43***	1.22***
	(-5.14)	(-3.59)	(-3.81)	(-3.87)	(-3.8)	(-5.21)
C. Bank Rate	13.57***	2.45	3.67*	3.37	3.79*	13.57***
	(-4.83)	(-1.09)	(-1.65)	(-1.55)	(-1.69)	(-4.89)
CPI	-12.66***	-0.05	-0.06	-0.04	-0.09	-12.66***
	(-5.26)	(-0.04)	(-0.04)	(-0.03)	(-0.06)	(-5.33)
VIX	-0.72	0.63***	0.54***	0.57***	0.53***	-0.72
	(-1.54)	(-3.27)	(-2.72)	(-2.99)	(-2.63)	(-1.56)
US 10y Yield	8.47	4.22	2.6	2.99	2.47	8.47
	(-1.23)	(-1.3)	(-0.79)	(-0.94)	(-0.75)	(-1.25)
Constant	1351.27***	-208.51	2897.70***	2965.14***	2873.69***	1351.27***
	(-6.76)	(-0.76)	(-5.75)	(-4.9)	(-6.03)	(-6.85)
σ_u				139.35***		
				(-11.85)		
σ_e				40.63***		
				(-36.38)		
Observations	754	754	754	754	754	754
Adjusted R^2	0.47	0.21				
F Test	40.01	20.05				
RMSE	107.6	40.87	42.39		42.87	

Table 5. Determinants of Net Spread (RE vs. FE)

Dependent variable is the Net Spread (in b.p.). Columns are following specification: 1) maximum likelihood RE, 2) fixed effects robust errors, and 3) fixed effects vector decomposition. Data from 1Q-2004 to 4Q-2013
Legend: * p<0.10; ** p<0.05; *** p<0.01 (*t* statistics in parentheses)

	MLRE	**FE ROBUST**	**FEVD**
Dividend Yield	0.01	0.53	0.53
	(-0.01)	(-0.31)	(-1.05)
Leverage	2.96***	3.17	3.17***
	(-4.42)	(-1.18)	(-10.54)
Growth	-0.25**	-0.28	-0.28***
	(-2.25)	(-1.10)	(-4.54)
ROE	-0.22	-0.35	-0.35
	(-0.54)	(-0.41)	(-1.63)
Size	3.68	16.79	16.79***
	(-0.71)	(-0.58)	(-21.09)
Equity Vol.	4.62***	3.88	3.88***
	(-4.32)	(-1.49)	(-12.65)
T. Maturity	25.35***	28.42**	28.42***
	(-9.47)	(-2.3)	(-24.98)
Moody's History	0.44	0.68	0.68***
	(-1.35)	(-1.07)	(-4.71)
(Lev)(T. Mat)	-0.47***	-0.51*	-0.51***
	(-6.00)	(-1.69)	(-13.08)
Moody's Initial	-10.68***	.	-13.77***
	(-5.50)	.	(-40.33)
Amount	-120.09***	.	39.01***
	(-3.96)	.	(-10.68)
Public Debt	-16.28**	-27.25	-27.25***
	(-2.02)	(-0.91)	(-21.74)
Financial Risk	0.42***	0.39***	0.39***
	(-3.87)	(-3.4)	(-4.54)
C. Bank Rate	3.37	2.45	2.45**
	(-1.55)	(-0.8)	(-2.39)
CPI	-0.04	-0.05	-0.05
	(-0.03)	(-0.03)	(-0.06)
VIX	0.57***	0.63	0.63***
	(-2.99)	(-1.21)	(-3.77)
US 10y Yield	2.99	4.22	4.22*
	(-0.94)	(-0.81)	(-1.71)
Residuals	2965.14***	-208.51	1.00***
	(-4.9)	(-0.21)	(-70.52)
Constant	0.01	0.53	-208.51***
	(-0.01)	(-0.31)	(-2.78)
σ_u	139.35***		
	(-11.85)		
σ_e	40.63***		
	(-36.38)		
Observations	754	754	754
Adjusted R^2		0.3	0.93
F Test		5.6	569.39
RMSE		38.56	38.64

Table 6. Determinants of Net Spread with dummy variables

Dependent variable is the Net Spread (b.p.) Dummies by country and industry are included. Data from 1Q-2004 to 4Q-2013. Legend: * p<.1; ** p<.05; *** p<.01 (*t* statistics in parentheses)

	Panel with Dummies
Dividend Yield	0.81
	(-0.48)
Leverage	3.22
	(-1.27)
Growth	-0.28
	(-1.19)
ROE	-0.22
	(-0.26)
Size	13.37
	(-0.54)
Equity Vol.	3.53
	(-1.5)
T. Maturity	24.61**
	(-2.15)
Moody's History	0.37
	(-0.59)
(Lev)(T. Mat)	-0.46
	(-1.60)
Moody's Initial	-16.39***
	(-4.29)
Amount	-78.69*
	(-1.77)
Public Debt	-40.38
	(-1.27)
Financial Risk	0.40***
	(-3.45)
C. Bank Rate	2.43
	(-0.79)
CPI	0.27
	(-0.14)
VIX	0.6
	(-1.1)
US 10y Yield	3.67
	(-0.72)
Brazil	81.73
	(-1.23)
Chile	-85.77
	(-0.31)
China	285.34
	-1.56
Colombia	-140.31
	(-0.76)
Indonesia	148.04**
	-2.18
Korea	-28.43
	(-0.17)
Mexico	215.72*
	(-1.89)
Malaysia	50.52
	(-0.48)
Peru	14.9
	(-0.27)
Philippines	48.44
	(-0.27)
Thailand	62.36
	(-0.40)
Financial	348.68***
	(-2.93)
Basic Mat.	176.81
	(-1.45)
Consumer	265.27**
	(-2.42)
Energy	147.16
	(-0.87)
Utilities	446.62***
	(-4.38)
Comm. & Tech	318.31***
	-3.73
Constant	2245.45***
	(-2.62)
Observations	754
RMSE	42.14

Figure 1. Average Net Spread (this is the average net spread for the pooled data by year, in basic points)

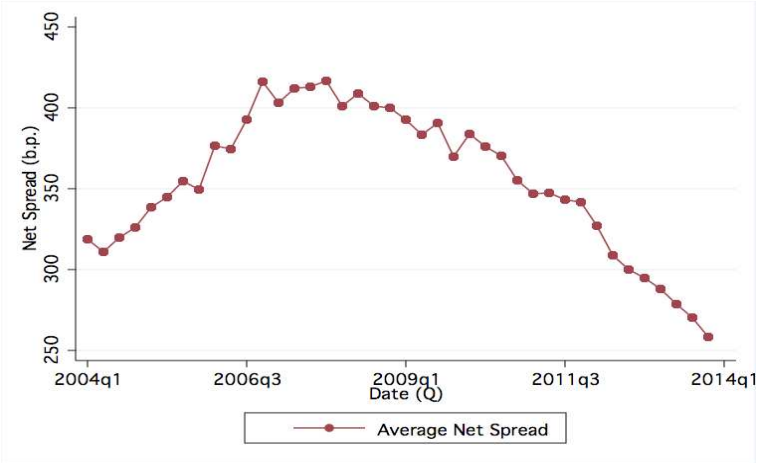

Figure 2. Net Spread by country. Hollow circle represents individual average observations between countries; connected diamonds are the average by country. Countries are AR: Argentina, BR: Brazil, CL: Chile, CO: Colombia, ID: India, IO: Indonesia, KO: Korea, MX: Mexico, PE: Peru, PH: Philippines, TH: Thailand, TK: Turkey and CN: China.

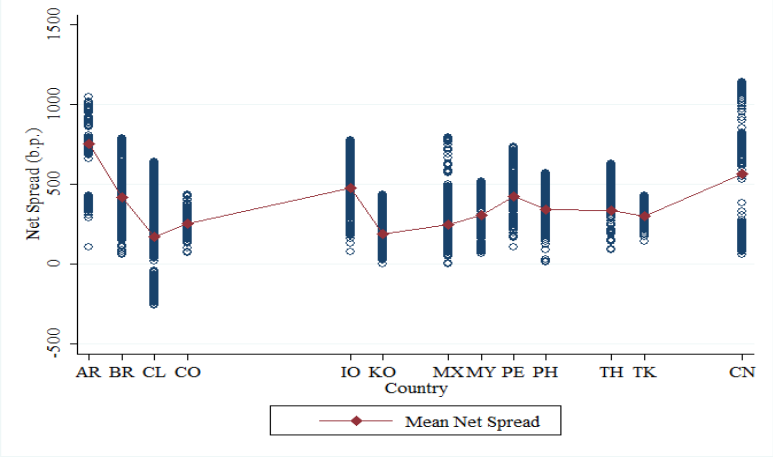

Figure 3. Net Spread by date. Hollow circle represents individual average observations within a quarter; connected diamonds are the average by quarter, from 1st quarter 2004 to fourth quarter 2013.