Determinants of the spread between yield to maturity of corporate and sovereign debt in Emerging Markets

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**Abstract**

The determinants of the spread between corporate and sovereign debt are a source of specific risk for a country. We use the data of a number of bonds issued by companies in 21 emerging markets in order to calculate the spread between their yield to maturity and the sovereign debt yield to maturity for each of these markets. By applying an econometric model we found the determinants of such spread, controlling for the term structure of the debt. The contribution of this paper is to point out the country and industry effects as determinants of the spread, not included in previous literature.

Keywords: Financial Markets, Bond Interest Rates, Risk Premium, Economic Development: Financial Markets; Saving and Capital Investment; Corporate Finance and Governance

JEL Codes: E44, G12, G150, O160

# Introduction

There are some several works on the determinants of the spread between the yield of the sovereign debt in a non-developed market, and the yield to maturity of the sovereign debt of a benchmark market (mainly USA). However, there are just few works on the determinants of the spread between the yield of the corporate debt against the yield of sovereign debt, particularly in Emerging Markets (EMs).

According to Peter & Grandes (2005) there are a vast number of empirical studies that assess the determinants of government yield spreads in EMs. Nevertheless, they completely ignore the relation between both, sovereign and corporate default risks. Some earlier works (Peter & Grandes, 2005; Briceño & Rivero, 2012) have found that the most important determinant of the risk of corporate default is sovereign risk. However they show that there are other determinants including firm specific factors.

We utilize a dataset of corporate and sovereign bonds retrieved from Bloomberg in order to find the determinants of the spread between the formers and the latest, for the countries included in MSCI Emerging Markets Index. Our data on the spread exploit a resource not employed before in previous works and available in Bloomberg, called Yield Adjusted Spread –YAS. It allows us to control for the term structure of the debt, avoiding missing information related with this variable.

We find the determinants of the spread between corporate and sovereign debt, controlling for the term structure of the debt. The main conclusion is that there are persistent country and industry effects, not enough explained in current literature. Then, it would be a newer approach to the country risk premium in debt instruments valuation.

# Literature review

## Determinants of sovereign spread

Baldacci, Gupta, & Mati (2008) define the country risk premiums as the sovereign bond spreads. In their work, they measure political risk and introduce fiscal variables into a model of spreads for a sample of 30 emerging market economies. They find out that fiscal and political factors are the key determinants of the country risk.

For Bellas, Papaioannou & Petrova (2010) macroeconomic variables are the main determinant of the sovereign spread in the long run, but financial volatility does in the short run. In the same line, Hilscher & Nosbush (2010) studied the effects of macroeconomic fundamentals on emerging market sovereign credit spreads. Volatility of terms of trade (instrumented with a country-specific commodity price index) and country fundamentals, have substantial explanatory power. On the other hand, Ferrucci (2003) points out that along with the macroeconomic factors, in emerging markets external liquidity conditions are also significant determinants of the sovereign spread.

In addition, Baek, Bandopadhyaya & Chan (2005) point out that in spite of macroeconomics is an important determinant of sovereign risk, the risk attitude of the market is another significant determinant. They constructed their own measure called Risk Appetite Index in order to assess the impact of the market attitude toward risk on the Brady bond spread. 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.

A recent study by Dahlquist & Hasseltoft (2013) found, more than the macroeconomic factors, the influence of local factors in bond risk premiums across international bond markets. In contrast, Westphalen (2001) considers that there is a systematic risk factor farther than just country risk, termed ‘sovereign bond market factor’ (Westphalen, 2001, pg. 22). Nonetheless, the author remarks that it needs to be tested if the corporate bond market influences this factor is.

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. Though this is not the scope of our research, they find that credit ratings have independent influence on credit spreads and are correlated positively with macroeconomic factors.

Martinez, Terceño & Teruel (2013) and Terceño et al. (2013) study the determinants of the sovereign spread for some Latin American countries, and test for the effects of the recent international crisis in 2008, finding significant results.

## The influence of sovereign risk

Theoretically, the private debt should be riskier than sovereign debt; in other words, the credit rating of a sovereign must be a ceiling for a corporate one (Cuadra, Sanchez, & Sapriza, 2010) in the same country. However, evidence shows that it is different in the bond markets (Durbin & Ng, 2005). According to Borensztein, Cowan, & Valenzuela (2006) before 1997 no credit rating agency gave lower rates to corporate issues, this practice was termed ‘sovereign ceiling’. But these authors stated that as accepted policy it was relaxed from 1997. In fact, Lee, Naranjo & Sirmans (2013) observed violations to this practice by countries with stronger institutions and with markets with better disclosure rules.

Borensztein, Cowan, & Valenzuela (2006) find that public debt affects private sector because the sovereign ratings are one of the main determinants of the ratings assigned to corporate debt. For Cáceres, Guzzo & Segoviano (2010) the sources of risk has changed from global risk aversion to a country specif factors, on the contrary to the stated by Whestphalen (2001). 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 not only the effect of sovereign ratings on bonds, but in stocks as well. They find that there is a contagion effect regarding the debt in regions studied; but this effect does not seem to occur with stocks, since there is a capital migration to the neighborhood when country is downgraded.

Ağca & Celasun (2009) argue that an increasing in public debt affects the private sector by rising up the risk of the country, which makes the private sector less attractive for foreign creditors. This is more critical in countries with scarce creditor rights. From a counter way perspective, Celasun & Harms (2011) assess the influence of corporate debt on the probability that any country defaults. They found that the more proportion of private debt, the less probability for a country’s default. In both cases the conclusions leads to an argument on the importance of the management of public debt.

In the subject of sovereign debt, there is a review by Panizza, Sturzenegger, & Zettelmeyer (2009), in which the authors found more relevance in theories treating the sovereign debt management from a country specific perspective (institutions) than from a global point of view (enforcement).

## Spread between Sovereign and Corporates

There are several works based on the theory of sovereign ceiling. From this perspective, researchers have tried to find as one of the determinants of the corporate spread, the sovereign debt itself.

Findings on corporate yield spread have placed on the table a discussion regarding the determinants of such spread. In spite of the several researches, findings are not conclusive. Several works 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. Moreover, literature from developed markets poses the same style of debate with results in different directions (Elton, Gruber, Agrawal, & Mann, 2002; Durbin & Ng, 2005; 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. For the authors, the credit ratings just explain a little fraction of the spread; and the systematic risk is the same as in the stock market. However, regarding this latter factor, King & Khan (2005) sustain that the Elton et al. work fails in the model specification and the systematic risk has a limited explicative power on the spread.

On the other hand, Durbin & Ng (2005) show that the corporate risk is positively correlated with sovereign default risk. Additionally, they found weak evidence on the sector (industry) factors affecting the corporate spread.

Cavallo & Valenzuela (2010) employ firm specific, country specific and industry specific variables. Moreover, they decompose the variance and found that the firm specific factors represent the biggest fraction of the overall variance. In the same line, Klein & Stellner (2013) found a similar behavior, by using a different methodology, for some European countries. On the contrary, Peter & Grandes (2005) and Grandes et al. (2010) argue that the sovereign risk is the most important determinant of corporate spread. They also test for the sovereign ceiling rule application and found up to 90% of rejection (e.g. Argentina).

Jaramillo & Weber (2013) use a sample of local bonds and found that fiscal variables affect bond yields depending on the global risk aversion.

### A note on the spread estimation

Most of the papers use a matching methodology to estimate the spread. Bonds are selected and matched by using the maturity date. Authors look for bonds with similar maturity and classified in the same category of risk. In this form, the spread is calculated by comparing similar bonds.

Elton et al. (2002) state the importance of the term structure of the debt in order to calculate the spread. For these authors 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. The spread is the difference between the spot rates. In this form, the influences of the coupon rate and the term structure of the debt over the spread are controlled.

In order to avoid the problem stated by Elton et al. (2002), Cavallo & Valenzuela apply the Option Adjusted Spread Analysis –OAS[[1]](#footnote-1) (Miler, 2010). It allows calculating the spread by using embedded options approach and controlling for potential pre-payments or changes in interest rates.

Even though the literature regarding country risk is extensive, it is not conclusive. Currently, there is not a final approach to the inclusion of country risk premium in valuation debt instruments. In a previous work Garay et al. (2014) found that there are some country and industry effects, not satisfactorily explained in current literature on the treatment of country risk in firm’s cost of equity valuation. In the literature related to country risk adjustments to the valuation models, it is assumed that country risk is explained primarily by the spread of a sovereign debt from another sovereign debt that is risk free (usually US T-Bonds). We consider that a more important source of country risk could be found from the spread between corporate and sovereign debt.

# Data and methodology

Provided that there are different classifications of emerging markets, we decide to use the MSCI emerging markets list, since this is the source of market data we access. Its constituents are 21 countries: 5 from Latin America, 8 from Asia, 5 from Europe and 3 from Africa. They are: Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Morocco, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand and Turkey.

We first include all the corporate bonds issued in US Dollars, to allow direct comparisons. When excluded only those bonds without special redemption covenants (e.g. callable, sinkable) or variable coupons (e.g. index linked), we obtain around 4.200 corporate bonds, active and matured.

We retrieve the data of sovereign and corporate bonds from Bloomberg. We employed the Yield Adjusted Spread (YAS) calculated in this database. YAS allows to value a fixed income security based on market data and calculates spreads to a benchmark issuing or benchmark curve. This tool interpolates the spread against a benchmark curve of a selected corporate bond.

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 foreign currency in some countries, and the low probability to find instruments with similar maturities in the same category of risk (Peter & Grandes, 2005).

We finally obtain data for 744 corporate bonds in 17 emerging markets. We retrieve information on the benchmark spread from 2004 to mid-2014, with quarterly frequency. Additional information on the issuer and macroeconomics was retrieved from Datastream for the same period.

## Model and variables

Descriptive statistics indicates that the average of the spread against a benchmark is around 244 basis points (bp). This variable exhibits a large standard deviation for pooled data, near 270 bb, similar to between standard deviation of 260 bp, in contrast with within standard deviation of around 70 bp. From descriptive statistics it is interesting to find negative minimum values, which indicates that some of the corporates in our dataset do not accomplish the ‘sovereign ceiling rule’. On the other hand, some of the bonds show spreads more than 4000 bp; a huge number that reflects deep differences in terms of risk faced for investors of those species. Results are separated by country to have more complete idea on the data (see table 1).

Table 1 about here

Our model uses as dependent variable the benchmark spread and use as independent variables a set of characteristics of the issue and the issuer. The model is defined as follows:

Where is a vector of firm (issuer) time variant characteristics, is a vector of bond (issuing) time variant and time invariant features, represents specific country macroeconomic variables, and T is a vector of some global controls. Each group of variables is described as follows:

* The vector of the firm specific characteristics is completely time variant. Variables considered are LEV: leverage, as total debt on total assets; ROA: return on assets; NMG: is a growth measure, obtained as the net margin 5 years growth; EVOL: is the equity volatility as price volatility; SIZ: in order to control for the size of the firm, and introduced by the logarithm of firm’s market capitalization=he other hand Ye time series. { then are fixed accross h alternative variables to control for same characteristics of the issue.
* The vector contains bond specific features. TM: is the time remaining to maturity; MOD: is a constructed score from Moody’s rating; and (LEV×TM) is an interaction of Leverage and Time remaining to maturity, in order to control for the effect of the risk due to longer time to maturity, but depending on the leverage level of the firm, in the same line of Cavallo & Valenzuela (2010).
* Our set of country specific variables includes the LGTPD: the effect of public debt, measured by the logarithm of total public debt; gross domestic product; BFR: Bloomberg’s financial country risk; CBR: central bank interest rate; BBI: Bloomberg’s bond index.
* And the global factors , where VIX: Chicago Options Exchange volatility index.

In order to find country and industry effects, we use a set of categorical variables by country and industry.

# Results and Discussion

More than a single specification, we use different models with alternative variables to control for different levels of characteristics described above. From descriptive statistics of variables we found that robust regressions were necessary in order to get efficient estimators.

Table 2 about here

The first results from the regression on the firm specific factors in column (1), are mostly statistically significant. The measure of return on assets is not significant, but the rest of variables employed do. The sign of the coefficient for Leverage is positive and significant, in the same line of the results for Cavallo & Valenzuela (2010). It is because the leverage makes riskier the firm.

Meanwhile, the sign for Volatility of Equity and Size are contrary to those results; the variable for Size has a positive sign and the variable for Volatility a negative one. The result for the first is counter intuitive, it could be though that as more volatile equities they are more attractive the bonds for investors. On the other hand the result for the latter refers to the change in the size, since it is calculated by the logarithm of the market capitalization.

We find an important negative effect on the spread, due to utilities growth. If this growth is associated as proxy with the growth of Free Cash Flow, and its availability, this positive sign must be related with the agency problem pointed out by Jensen (1986).

In this regression the inclusion of dummies for country and industry, just reveals significant coefficients for India and Korea.

In the second and third specifications (columns SPF 2 and SPF 3) we include some bond characteristics. In both of them time to maturity has positive sign and statistical significance, which is intuitive for the risk associated with greater time remaining to maturity. However the interaction of this variable with leverage, suggested by Cavallo & Valenzuela (2010) does not have statistical significance in model 2. On the other hand, Moody’s rating has the expected negative sign and statistical significance.

When dummies included in these two specifications, both of them show significant coefficients for Czech Republic and India; but the SPF(3) also gives significant coefficients for Industrial and Utilities sectors. Furthermore, Moody’s rating becomes not statistically significant.

Regression in column 4 controls for country specific factors. The most remarkable result here is that Size control changes sign. It is more intuitive since bigger firms must have lower risk. Here Bloomberg’s bond index, have negative sign. Markets highly rated have lower risk and this fact positively impact corporate issues.

Nonetheless, the negative sign in the total public debt control is not as intuitive as well. One can interpret that higher levels of public debt make more attractive private debt, increasing the prices and, therefore, reducing the yield of this latter. Financial risk has the expected positive sign, because the more financial risk, the greater the spread.

We included the categorical variables for this model and most of the country variables become statistically not significant, excepting the total public debt change, calculated by the logarithm of total public debt. Such effects are absorbed by dummies. Coefficients for Chile, Indonesia, Mexico, Peru, Russia, Thailand and Turkey are considerably negative and statistically significant. On the other hand Basic Materials and Energy sectors, show positive sign and are significant too.

In the last column we include the VIX Index as control for global volatility. However, results do not change in any sense, nor the signs, neither the statistically significance.

## Robustness checks

As this is a working paper, we are considering different robustness checks. We consider that some of our firm specific variables could have endogeneity problems. On the other hand, findings on the effect of the total public debt deserve deeper analysis. The effect of the level of public debt is counter intuitive; several research before show the impact of sovereign ratings on the corporate spreads, as cited previously in literature review.

# Conclusions

Country risk is an important decision variable when investors look for investments in emerging markets; particularly when markets are segmented. This kind of markets makes more difficult to investors diversifying risk. Variables related with firm specific factors and macroeconomic fundamentals have been found to be determinants of the country risk premiums. Our dataset and the model we employ show that country and industry specific variables persist, and point out the necessity for a different perspective to treat the topic of the country risk.

It has been shown that fiscal and monetary policy towards financial healthy of the countries are mechanism to reduce country risk, since better ratings and lower financial risk, positively impact private issues. They entails to a better public debt management, helpfully affecting corporates. However, it is possible to find some missed variables, or even interactions, that better explain differences in country risk premium, for countries in similar conditions of economic development.

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Tables

Table 1. Panel A. Descriptive statistics of benchmark spread by country (bp)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Country | Obs. | Mean | Std. Dev. | Min | Max |
| Argentina | 924 | 227.223 | 184.206 | -44.389 | 921.761 |
| Brazil | 4368 | 259.462 | 408.692 | -90.309 | 4105.568 |
| Chile | 1596 | 261.704 | 212.015 | -74.519 | 1158.969 |
| China | 1933 | 271.423 | 181.486 | -81.859 | 1134.734 |
| Colombia | 1092 | 251.524 | 183.400 | -48.366 | 776.907 |
| Czech Republic | 168 | 143.840 | 159.744 | 37.521 | 435.804 |
| India | 1092 | 279.114 | 153.357 | -7.726 | 741.086 |
| Indonesia | 252 | 337.499 | 121.265 | 17.890 | 612.802 |
| Korea | 3109 | 295.444 | 186.577 | -52.498 | 1018.801 |
| Malaysia | 756 | 222.269 | 166.593 | -189.937 | 610.240 |
| Mexico | 2605 | 250.828 | 195.323 | -138.898 | 1141.767 |
| Morocco | 42 | 379.203 | 151.232 | -25.128 | 473.253 |
| Peru | 1386 | 192.382 | 127.198 | -72.168 | 612.192 |
| Philippines | 672 | 468.158 | 843.300 | -43.263 | 4128.393 |
| Russia | 84 | 165.582 | 77.553 | -2.520 | 321.188 |
| Thailand | 1008 | 330.516 | 280.016 | -40.951 | 1242.602 |
| Turkey | 8994 | 187.245 | 182.541 | -166.270 | 1356.448 |

Table 1. Panel B. Descriptive statistics of benchmark spread by industry (bp)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Industry | Obs. | Mean | Std. Dev. | Min | Max |
| Financial | 15924 | 201.196 | 191.606 | -166.270 | 1356.448 |
| Basic Materials | 2814 | 320.706 | 228.135 | -53.469 | 1258.260 |
| Industrial | 252 | 228.765 | 119.790 | 99.037 | 505.8699 |
| Consumer Goods | 3150 | 366.055 | 583.548 | -43.263 | 4128.393 |
| Energy | 1806 | 292.494 | 207.114 | -40.951 | 1242.602 |
| Utilities | 2815 | 251.569 | 168.962 | -189.937 | 828.513 |
| Communications & Technology | 3068 | 236.429 | 180.682 | -138.898 | 1141.767 |
| Diversified | 252 | 253.115 | 139.812 | -14.487 | 523.799 |

Table 2. Determinants of benchmark spread

Dependent variable is the Benchmark Spread (in bp). The first five columns are the results of the regressions 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 5) all described characteristics plus a global factor. The last five columns yield the results of the same first five regressions, but including country and industry dummies, not reported.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | SPF(1) | SPF(2) | SPF(3) | SPF(4) | SPF(5) | SPF(1.1) | SPF(2.1) | SPF(3.1) | SPF(4.1) | SPF(5.1) |
| Return on assets | 0.259 | 0.502 | 0.873 | 0.699 | 0.715 | 0.244 | 0.494 | 0.872 | 0.528 | 0.545 |
| Total debt/Total assets | 0.616\*\*\* | 0.203 | 0.220 | -0.412 | -0.408 | 0.614\*\*\* | 0.206 | 0.224 | -0.504\* | -0.499\* |
| Net margin 5y growth | -0.122\*\*\* | -0.249\*\* | -0.356\*\* | -0.156\* | -0.158\* | -0.121\*\*\* | -0.249\*\* | -0.355\*\* | -0.145 | -0.148\* |
| Price volatility | -0.681\*\* | 0.364 | 0.212 | -0.317 | -0.328 | -0.677\*\* | 0.367 | 0.212 | 0.140 | 0.125 |
| Log (Market Cap.) | 8.523\*\*\* | 12.563\*\*\* | 15.018\*\* | -14.437\*\*\* | -14.499\*\*\* | 8.470\*\*\* | 12.687\*\*\* | 15.541\*\* | -16.185\*\*\* | -16.249\*\*\* |
| Time to maturity |  | 7.277\*\*\* | 6.740\*\*\* | 25.659\*\*\* | 25.690\*\*\* |  | 7.260\*\*\* | 6.724\*\*\* | 26.003\*\*\* | 26.038\*\*\* |
| Leverage\*Time to mat |  | -0.055 |  |  |  |  | -0.055 |  |  |  |
| Moody's rating |  |  | -3.032\*\* | -6.483\*\*\* | -6.497\*\*\* |  |  | -1.560 | -2.788 | -2.803 |
| Log(Total Public Debt) |  |  |  | -22.879\*\*\* | -23.006\*\*\* |  |  |  | -68.085\*\*\* | -68.016\*\*\* |
| Financial Risk |  |  |  | 0.212\*\*\* | 0.213\*\*\* |  |  |  | 0.122 | 0.124 |
| Central Bank Rate |  |  |  | 1.051 | 1.105 |  |  |  | 0.793 | 0.852 |
| Bloomberg Bond Idx |  |  |  | -0.488\* | -0.488\* |  |  |  | -0.100 | -0.101 |
| VIX |  |  |  |  | 0.070 |  |  |  |  | 0.069 |
| Constant | 104.224\*\* | 6.233 | 155.351 | 1123.124\*\*\* | 1119.881\*\*\* | 136.569\* | -84.319 | -76.604 | 1598.093\*\*\* | 1592.891\*\*\* |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| r2\_o | 0.019 | 0.000 | 0.001 | 0.112 | 0.112 | 0.022 | 0.082 | 0.044 | 0.197 | 0.197 |
| r2\_b | 0.037 | 0.009 | 0.011 | 0.055 | 0.055 | 0.028 | 0.137 | 0.045 | 0.168 | 0.168 |
| r2\_w | 0.027 | 0.134 | 0.152 | 0.519 | 0.520 | 0.027 | 0.134 | 0.152 | 0.524 | 0.525 |
| sigma\_u | 231.927 | 290.289 | 279.499 | 160.381 | 161.166 | 227.694 | 275.942 | 287.569 | 156.836 | 157.850 |
| sigma\_e | 47.396 | 44.306 | 53.865 | 35.809 | 35.793 | 47.396 | 44.306 | 53.865 | 35.809 | 35.793 |
| rho | 0.960 | 0.977 | 0.964 | 0.953 | 0.953 | 0.958 | 0.975 | 0.966 | 0.950 | 0.951 |

Legend: \* p<.1; \*\* p<.05; \*\*\* p<.01

1. OAS analyzes the cash flow associated to a bond with the market’s interest rates and values the embedded options against the market volatility. [↑](#footnote-ref-1)