Abstract

The cost of capital in emerging markets

by

John Rosso

MA, UTP, 2002

BS, UTP, 1994

Dissertation submitted in partial fulfillment

of the requirements for the Degree of

Doctor of Philosophy in Administration

Universidad de Los Andes

School of Management

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Abstract

I applied nine methods already proposed in the literature to calculate the cost of equity of companies from the six largest stock markets in Latin America, included in the MSCI emerging markets list. A number of these methods modify the discount rate obtained using the standard Capital Asset Pricing Model (CAPM) by adjusting for country risk premiums. I found a strong correlation between the results yielded by a number of these methods. I then applied an econometric test based on categorical variables to determine whether the estimated cost of equity is influenced by country and industry effects. I found that industry effects are more important than country effects in Latin America. This work gives empirical evidence for specific country and industry determinants of the cost of equity that are not explicitly treated in the extant literature.

Then, I examine the determinants of the spread between corporate and sovereign debt yields. I use data of corporate bonds in fifteen emerging markets in order to calculate the spread between their yield to maturity and the respective sovereign debt yield to maturity for each of these markets. I found the determinants of such spread, controlling for debt term structure, and other variables. Additionally, I found industry and country effects not explained by variables at firm, issue, country, or international levels. The contribution of this work is to point out that industry effects are more important than country effects in explaining the spread, even when controlling by country and industry specific factors.

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Dedication

To my children Mathias and Laura Lucia, I hope to be a good example for their lives.

A∴L∴G∴D∴G∴A∴D∴U∴

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Introduction

Emerging Markets (EMs) have been source of interest, opportunity and anxiety for investors in the last twenty years (Khanna & Palepu, 2013). Emerging markets have become important recipients of foreign direct investments during this period; local capital markets have gained importance and foreign investors have been much more interested in local companies (Hearn, Piesse, & Strange, 2010). However, stocks from emerging market companies exhibit greater costs than comparable stocks from developed markets due to the risk premium inherent to these investments; partly because emerging economies suffer a number of market imperfections (Korinek, 2010). Under this scenario, a major concern for investors should be the compensation required over their investments, provided the risk assumed in such markets.

There are two main approaches to firm valuation in EMs. The first centers on the analysis and inclusion of risk factors into cash flows. The second focuses on the use of an appropriate discount rate, which incorporates risk into expected cash flows (Pereiro, 2006, p. 163). Our first paper centers on the second approach, as the determination of an appropriate discount rate for valuating projects in EMs has become an extremely important research problem in finance (Bodnar, Dumas, & Marston, 2003). The cost of equity in emerging markets has received an increasing attention in the financial literature and several models have been developed in order to improve the accuracy and reliability of rates of return on equity estimations for firms based in these markets.

The country risk premium has been incorporated into a firms' cost of equity by using different methods proposed in the literature and which are currently available to practitioners. Some methods just add a country risk premium (CRP) to the original CAPM model. This premium is considered to be the extra return required by investors because of their exposure to an EM risk (Damodaran, 2009). Another set of methods adjusts the beta factor before calculating the CAPM discount rate (Godfrey & Espinosa, 1996; Lessard, 1996; Sabal, 2008). This ‘Adjusted Beta’ tries to include some country risk corrections in an extensive way.

Some researchers have made an attempt to evaluate the results obtained through these methods. For example, Fuenzalida and Mongrut (2010) used seven methods to compare results in Latin America: Local CAPM, Global CAPM, Goldman Sachs, Lessard, D-CAPM, the hybrid method Bodnar et al, and Damodaran. Also, Mongrut et al. (2010), who evaluated the results of four methods in the Baltic region, by using the methods of D-CAPM, Damodaran and Mariscal & Lee. Likewise, in a case study, Molina and Santos (2010) compared seven cost of equity estimation methods with actual observations on a hostile takeover. In some cases, there are different branches of methods to evaluate up to 12 different ways of calculating the discount rate (Harvey, 2005). However, no definitive conclusions have been stated about the findings of these studies.

Following the same line of reasoning used by Anshuman et al. (2011), our main objective is not to directly evaluate the effectiveness of each cost of equity estimation method. Since “true” discount rates are unobservable, it is almost impossible to assess which method is better at predicting the “true” discount rates. On the contrary, the aim of the first part of this research is, on the one hand, to compare and analyze the results yielded by these methods with the Total Stock Returns (TSR) observed in firms in Latin American stock markets; and, on the other hand, to evaluate the impact of country and industry effects on estimated discount rates.

The most common practice in order to account for emerging markets risk is to simply to add a premium to the discount rate obtained from the CAPM. References of this fact are not are not only found in the academic literature (Cruces, Buscaglia, & Alonso, 2002; Mishra & O'Brien, 2001), but also in nonacademic articles, which are commonly written for practitioners (KPMG Valuations Group, 2013; New South Wales Government, 2007).

Damodaran (2009) states that the risk premium is commonly measured by the spread between the yield of the sovereign debt of an emerging market, and the yield of a benchmark (usually a U.S. T-Bond). This premium is considered to be the extra return required by investors because of their exposure to an EM risk (Damodaran, 2009). We, in turn, consider the spread between corporate debt and sovereign debt as a source of risk and find the determinants of such spread in our second paper. According to Peter & Grandes (2005) there exists an extensive empirical literature that assess the determinants of government yield spreads in EMs. Nevertheless, the scope of the research does not take into account the relation between both, sovereign and corporate default risks.

Earlier research (Peter & Grandes, 2005; Briceño & Rivero, 2012) found that the most important determinant of the risk of corporate default for firms from emerging markets is sovereign risk. However, they show that there are other determinants including firm specific factors.

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 fully explained in the current literature. In the second part of this research I 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.

This document is organized as follows: in the first chapter I present the article "Estimating the cost of equity in emerging markets: the case of Latin America" and in the second chapter, the article "Determinants of the spread between the yield to maturity of corporate and sovereign debt in emerging markets".

Chapter 1 Estimating the cost of equity in emerging markets: the case of Latin America

Introduction

Investments in emerging stock markets have become an increasingly important alternative for globally diversified investors because of the higher economic growth rates experienced by these economies in the past two decades, the relatively low correlation between emerging and developed markets, and in spite of the riskiness involved when investing in these markets (Errunza & Losq, 1987; Van Agtmael, 2007). A model commonly employed to value a firms' cost of capital in emerging markets is simply to add a country risk premium to the discount rate obtained from the CAPM (see, for example, Cruces, Buscaglia, & Alonso, 2002; Mishra & O'Brien, 2001). Throughout this paper we will refer to this approach as the "investment-banking" model (CAPM-IB).

There are two main approaches to valuation that attempt to account for the idiosyncrasies of emerging markets. The first centers on the analysis and inclusion of specific risk factors into a firm's cash flows. The second focuses on the use of a risk-adjusted discount rate[1](Pereiro, 2006). According to Godfrey & Espinosa (1996), a risk-adjusted discount rate does not solve the problem of incorporating country risk into the valuation analysis because it is necessary to analyze deeper changes in the cash flows to get more accurate results. However, country risk has been incorporated into a firms' cost of equity by using different methods proposed in the literature and which are currently available to practitioners.

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[1] There is evidence that practitioners prefer this approach, instead to modify/adjust the cash flows (Bruner, Eades, Harris, & Higgins, 1998).

Our work centers in the second approach. In particular, we empirically assess the effects of these methods on the cost of equity for firms in the six largest Latin American emerging markets: Argentina, Brazil, Chile, Colombia, Mexico and Peru. These markets are included in the MSCI emerging markets list, except Argentina (which was included in the list up to 2009). We use data for the period 2004 to 2012 and divide our sample in periods of two years to apply the aforementioned methods. Then, we applied a regression analysis method with categorical variables, in order to test the presence of country and industry effects, as suggested in the literature (Heston & Rouwenhorst, 1994; Griffin & Karolyi, 1998; Baca, Garbe, & Weiss, 2000; Ferreira & Ferreira, 2006; Flavin, 2004; and Ye Bai, Green, & Leger, 2012).

Following the same line of reasoning used by Anshuman et al. (2011), our main objective is not to directly evaluate the effectiveness of each cost of equity estimation method. Since "true" discount rates are unobservable, it is almost impossible to assess which method is better at predicting the "true" discount rates. On the contrary, the aim of this paper is, on the one hand, to compare and analyze the results yielded by these methods with the Total Stock Returns (TSR) observed in firms in Latin American stock markets; and, on the other hand, to evaluate the impact of country and industry effects on estimated discount rates.

Using the information on the Total Return Index as a proxy for the unobserved cost of equity, we compare the expected return rate obtained with each method. Descriptive statistics show that most of the methods tend to yield rates that are above the observed TSR. Moreover, we found very similar results from the CAPM-IB, D-CAPM, CRM, and

Lessards' methods. We observe that after the 2008 crisis, methods that use a world portfolio as a benchmark yielded a considerable inferior estimation of the rates of return.

Our main findings indicate that the cost of equity estimates obtained with these methods depends heavily on the industry sector to which the firm belongs to and, to a lesser extent, on the country where the firm is located. For example, estimating the cost of equity for a financial firm in Peru shows very different results depending on the method employed; however, when a financial firm is valued using the same methods, results are far more variable in Argentina than in Peru (0.9% vs. 0.3% respectively).

Our results give a better understanding of the effects of country risk adjustments on a firms' cost of equity in Latin America. Our findings are important in two dimensions. First, they alert practitioners (i.e., investors) using only the CAPM-IB about the impact on the estimated cost of equity of using other available methods. Furthermore, they can observe that each method will yield different results that depend on the country or the industry where they are applied. Second, our work gives empirical evidence on how country and industry factors are determinants of the cost of equity, which current methods do not consider. From this perspective, we present the baseline for future research on theoretical models where industry and country determinants should be explicitly included.

The rest of the paper is organized as follow. In section 2 we review the current literature on how to incorporate country risk into the cost of equity and summarize the different methods available. In section 3 we describe our database, the sources of information and the methodology employed. In section 4 we present and analyze our main results; finally, in section 5, we conclude.

Literature review and valuation models for emerging markets

According to Bodnar, Dumas & Marston (2003), the determination of an appropriate discount rate for valuing projects has become an increasingly important research problem in finance because it is a challenge to incorporate the different existing dimensions of risk in the cost of capital; and also because firms increasingly are more multinational in their operations. Some methods simply add a country risk premium to the original CAPM. This premium is considered an extra return required by investors for their risk exposure in emerging markets (Damodaran, 2009). However, this arbitrary adjustment to firm valuation is considered a mistake by Estrada (2007) since it is not based on available objective information for the particular emerging market and it may lead to possibly overlooking valuable projects; moreover, he considers that it is an ad-hoc approach and theory does not support these adjustments. According to Sabal (2004), country risk is diversifiable and hence adding a country risk premium is not the best form to account for country risk; moreover, for Lessard (1996), the result of adding a country risk premium is usually an overestimation of the cost of equity. For Cruces et al (2002) this ad-hoc addition of risk, does not account for the term structure of default risk and leads to an overvaluation (undervaluation) of long-term projects when the term structure of default risk is upward (downward) sloping. Finally, Harvey (2004) states that country risk measures determine equity returns for companies in segmented (in some degree) emerging markets.

Another set of methods adjust the Beta factor before calculating the CAPM discount rate (Godfrey & Espinosa, 1996; Lessard, 1996). This adjusted Beta attempts to include some country risk corrections to the theoretical definition of systematic risk. However, some authors consider that this adjustment is not supported by a strong theoretical foundation (Bekaert & Harvey, 2002) and in spite to be motivated by “sound economic intuition, it relies on insufficient empirical evidence” (Andrade, 2009, p. 671).

Previous attempts to evaluate the estimation of the cost of equity through different methods include Fuenzalida & Mongrut (2010), who used seven methods to compare the valuation outcomes for a set of Latin American firms. They concluded that no single method is better than the others in their sample; for instance, they state that it is more recommendable to incorporate country risk in firm’s cash flows. In other work, Mongrut et al. (2010) evaluated results from the Baltic region using four different methods and showed how the cost of equity increased in an particular time framework. They found that the Downside CAPM, which we also test in this paper, better fits the cost of equity for this region in their specific time framework (Estrada, 1999 and 2006). A case study by Molina & Santos (2010) compared seven methods used to value an acquisition target, but made no conclusions about the reliability of any of the methods. Harvey (2005) used as many as twelve different forms to calculate the discount rate for valuation and found a wide variation between results. He concluded that there is a general disagreement in how to incorporate country risk in models for international equity valuation.

It is clear that, to date, there are no definitive conclusions regarding how to incorporate country risk into the cost of equity. This paper shows the differences in discount rates obtained when applying different methods in Latin American countries; and, furthermore, assesses country and industry effects affecting those discount rates, but not explicitly explained by the methods employed.

To facilitate an understanding of the different methods, Table 1 shows a summary of each one (see Table 1).

Table 1.

Summary of the Cost of Equity Estimation Methods

Method	Model	Description
Local CAPM (Stulz, 1995; Mishra & O'Brien, 2001)	$R_E = r_{fL} + \beta_{LL}(R_{ML} - r_{fL})$	Where: R_{ML} = the local market return, r_{fL} = the local risk-free rate; β_{LL} is the local company Beta against the local market
Global CAPM (Stulz, 1995)	$R_E = r_{fG} + \beta_{LG}(R_{MG} - r_{fG})$	Where: R_{MG} global portfolio, r_{fG} = global risk-free rate; β_{LG} local firm Beta against the global market
Hybrid CAPM (Bodnar et al., 2003)	$E[R_i - r_f] = E[R_w - r_f]\beta_{i/w} + E[R_c - r_{f_l}]\beta_{i/c}$	Where: R_w = the global market return; R_C = the local market return; $\beta_{i/w}$ = the *i* asset's sensitivity to the global market; $\beta_{i/c}$ = the *i* asset's sensitivity to the local market
International CAPM (Bodnar et al., 2003)	$E[R_i - r_f] = E[R_w - r_f]\beta_{i/w} + E[R_S - r_f]\beta_{i/S}$	Where: R_w = the global market return; R_C = the local market return; $\beta_{i/w}$ = the *i* asset's sensitivity to the global market; $\beta_{i/S}$ = the *i* asset's sensitivity to the rates of return of non-measurement currency deposits, all measured in some measurement currency
Country Risk Modulator (Sabal, 2008)	$R_j = r_f + (R_M - r_f)\beta_{BM} + \lambda CR$	Where: β_{BM} is the Beta of a similar project in a developed market; $\lambda = \beta_{iM}{}^2\,(\sigma_M/\sigma_i)^2$. And β_{iM} is the Beta of the local index related to the global index: $\beta_{iM} = \sigma_{i,M}/\sigma_M^2 = \rho_{i,M}\,(\sigma_i/\sigma_M)$. *CR* is the country risk spread
Downside CAPM (Estrada, 1999, 2006)	$r_{DR} = r_f + (r_M - r_f)\left(\frac{\Sigma_{\mu i}}{\Sigma_{\mu M}}\right)$	Where: $\Sigma_{\mu i}$ is the standard semi-deviation of the return of asset *i*, and $\Sigma_{\mu M}$ is the standard semi-deviation of the return of benchmark market $\Sigma_{\mu i} = \sqrt{\frac{\sum(R_t - B)^2}{T}}, \forall R_t < B$
Godfrey & Espinosa (1996)	$r_j = r_{fUS} + CS + \left[0{,}6 \times \left(\frac{\sigma_j}{\sigma_m}\right) \times (MRP_{US})\right]$	Where: CS is the credit spread due to the sovereign debt, and MRP_{US} is the U.S. market risk premium
Lessard (1996)	$R_E = r_f + \beta_{Country}(R_M - r_f)$	Where: $\beta_{Country} = \beta_P \times \beta_C$. Where: β_P =Industry Beta; β_C =Country Beta

Note: This summary of the methods employed for the equity cost calculation includes the main reference, the model and a short description of the variables used.

Local vs. global CAPM

The standard CAPM (Sharpe, 1964; Lintner, 1965; Mossin, 1966) assumes that markets are completely integrated. The CAPM has been later adapted for the differences between segmented and integrated markets. Several authors consider that the issue of market integration is a central factor in a firms' equity return in emerging markets (Bekaert & Harvey, 2003; Bodnar et al., 2003). However, most observed returns in emerging markets are not sufficiently explained by the theory that assumes complete integration of financial markets (C. Harvey, 1995). On the other hand, Garret, Hyde & Varas (2004) found a strong influence of the U.S. stock market on Latin American stock market. Their sample included the five countries in this study, in a time frame from a previous decade.

For Dolde et al. (2011), the key factor that accounts for differences between discount rates calculated by using a global or a local CAPM model, is the exposure to currency risk. They found that companies with extreme exposure to currency risk observed high differences between the expected return rates calculated by using both of those methods. This contrasts with the findings of Harris et al. (2003), who found that there are not significant differences between local and global models of CAPM when U.S. firms evaluate foreign investments.

Saleem & Vaihekosky (2008) studied the price of risk in Russia, and found that it is necessary to use a multifactor approach to account for local risk and currency risk, beyond a singular global factor. This is partially in line with findings of Bruner et al. (2008) for whom multifactor models are important for some cases of companies from emerging markets. They argue that the selection of a global or a local model is more important for companies from emerging than from developed countries.

Local CAPM According to Stulz (1995) the local CAPM is an adaptation by practitioners which mimics the CAPM in the U.S. market. A local market index is used as the proxy for the market portfolio. This model is suggested for firms listed in segmented markets (Stulz, 1995; Mishra & O'Brien, 2001). It is defined as:

$$R_E = r_{fL} + \beta_{LL}(R_{ML} - r_{fL}) \quad (1)$$

Where R_{ML} is the local stock market return, r_{fL} is the local risk-free rate and β_{LL} is the local company Beta, calculated against the local market (in local currency).

However, it is important to highlight that one of the problems encountered when calculating the Local CAPM is that one needs to have access to complete and reliable information on the local markets. In Latin America, for example, markets are not large enough to have a good proxy for the local portfolio. On the other hand, the liquidity of the securities does not guarantee that stock pricing information is enough to correctly estimate local betas.

Global CAPM The increasing integration of emerging markets to the global market leads to more sensitivity to global factors (Thapa, 2007). The global CAPM estimates the returns of a firm against a worldwide portfolio. The model is:

$$R_E = r_{fG} + \beta_{LG}(R_{MG} - r_{fG}) \quad (2)$$

where R_{MG} is a global portfolio (Stulz, 1995); r_{fG} is the global risk free rate; β_{LG} is the local company Beta against the global market. Harvey (1995) argues that it is difficult to find a relationship between the expected returns and global Betas in emerging markets, because the formers are influenced by local rather than global information variables.

We do not consider other CAPM-based methods such as Goldman Sachs (Mariscal & Hargis, 1999) or Salomon Smith Barney (Zenner & Akaydin, 2002) because they require the use of firm-specific inputs which are very difficult to obtain. There is idiosyncratic risk in the Goldman Sachs model, and the parameters $\gamma_1, \gamma_2, \gamma_3$ in the Salomon Smith Barney model refer to three scores that could be subjective. Finally, we do not use other methods such as Erb, Harvey & Viskanta (1995), multiples or real options, because they are not CAPM-based. Moreover, the first one is based in a particular measure of country risk developed by the authors, which is difficult to apply in an objective way.

The data and the methodology

Data sources

We use the closing stock price data[2] of firms publicly traded in the six largest Latin American stock markets: Argentina, Brazil, Chile, Colombia, Mexico, and Peru. We selected active stocks yearly, from 2004 to 2013 (see table 2). The information was retrieved from Bloomberg's database with monthly frequency. Returns were calculated by using multi-period returns and were arithmetically annualized, as in Damodaran (2009).

[2] All prices were obtained in U.S. dollars, in order to make the results comparable. In the case of the Local CAPM, data were downloaded in local currency, but results were corrected by local/benchmark inflation rates by using:

$$r_E^* = \left[\frac{1 + r_E}{1 + I_{US}}\right](1 + I_{LCL}) - 1$$

Where: I_{US} is the yearly U.S. inflation for the current year and I_{LCL} is the yearly local inflation for the respective year.

Table 2.

Panel A. Number of stocks by period

Period	Number of Stocks
2004-2005	268
2005-2006	369
2006-2007	461
200-7-2008	533
2008-2009	561
2009-2010	531
2010-2011	543
2011-2012	553
2012-2013	559

Note: own elaboration using data from Bloomberg

Panel B. Number of stocks by country

Country	Number of Stocks
Argentina	72
Brazil	336
Chile	212
Colombia	24
Mexico	100
Peru	62

Note: own elaboration using data from Bloomberg

Panel C. Number of stocks by Industry

Industry	Number of Stocks
Basic Materials	101
Financial	152
Industrial	99
Consumer, Cyclical	127
Consumer, Non-cyclical	146
Communications & Tech	56
Energy	24
Utilities	80
Diversified	22

Note: own elaboration using data from Bloomberg

To standardize the data for the purpose of comparisons, all local indexes employed here were taken from the Morgan Stanley Indexes[3] available at Bloomberg. We decided to use this family of indexes, provided that they employ the same methodology of construction and it allows us to avoid any bias due to differences in the methodology of construction of local indexes.

The U.S. risk-free rate used as a benchmark was obtained from reports of the U.S. Federal Reserve.[4] These rates are calculated as the simple annual average of the observed return rates from T-Bonds in a time window of ten years. A constant maturity guarantees their comparability. For local risk-free rates the data was retrieved from Bloomberg by

[3] The MSCI Emerging Markets Index is a free float-adjusted market capitalization index that is designed to measure equity market performance of emerging markets. The MSCI Emerging Markets Index consists of the following 23 emerging market country indexes (2014): Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, Philippines, Poland, Qatar, Russia, South Africa, Taiwan, Thailand, Turkey* and United Arab Emirates. For complete information on the indexes refer to: http://www.msci.com/products/indexes/tools/#TOTALRET

[4] http://www.federalreserve.gov/releases/h15/data.htm

using the yield curves of each country's sovereign debt in local currency. Provided that this data is calculated for different maturities, we used the ten-year returns.

To add a country risk premium, we employed Credit Default Swaps (CDS) data from Bloomberg, as suggested by Damodaran (2009). According to this author, CDS provide a more updated and precise measure of country risk than measures based in bond default spreads (e.g. EMBI plus from J. P. Morgan). We obtain the historical CDS rate for each country and netted them by using U.S. CDS.

To obtain the particular Beta of each company, we built the unlevered Betas by industry with the U.S. market data. We found the observed Betas of the different sectors, with the averaged tax rates and debt-to-equity relationship. Then we recalculated each particular Beta by applying the Hamada's transformation, as given in Copeland et. al (2006, p. 598), to the single data of effective tax rates and debt-to-equity ratios for each firm. To significantly reduce the computational load, we assume that all firms have access to a risk free rate debt. On the other hand, Fernandez proposes different ways to calculate the levered Beta when firms do not have access to the risk free rate; however, Betas for public debt are neither always available nor easy to compute (see the Appendix).

All the remaining Betas for each of three particular methods (local, global and currency Betas) were calculated with historical data from Bloomberg. The regressions were run for periods of two years with monthly frequency. In the case of the Local CAPM, betas were obtained by running a simple OLS regression between firms' returns with a local market index; for global betas the same regression was run against world market portfolio; and for currency betas it was again a currency exchange rate index. Regression equations are presented next for Local, Global and Currency Betas, respectively[5] (See equations 3, 4 and 5).

$$R_{it} = \alpha_i + \beta_{MLt} R_{MLt} + \varepsilon_t \quad (3)$$

$$R_{it} = \alpha_i + \beta_{Wt} R_{Wt} + \varepsilon_t \quad (4)$$

$$R_{it} = \alpha_i + \beta_{St} R_{St} + \varepsilon_t \quad (5)$$

Once we obtained the specific Beta for each firm, we applied the CAPM model modified as in Damodaran (2003), by simply adding a country risk premium to the discount rate obtained from the CAPM. According to this author, the most common assumption when dealing with country risk, is that all the firms in a given country are exposed to the same country risk (Damodaran, 2003, p. 17). Then, the calculation of the cost of equity for any firm simply adds a Country Risk Premium to the discount rate obtained from the CAPM for another firm in the same sector in a developed market. That is what we refer as CAPM investment banking (CAPM-IB). Then we apply the rest of the eight methods described in section 2 to compare the discount rates obtained using these methods to the rates obtained using the CAPM-IB. We retrieved the information on the Total Return Index for each firm in our sample; then, we calculated the Total Stock Return (TSR) as a proxy for the observed equity rates of return for each firm. According to Berk & DeMarzo (2014) the TSR equals the dividend yield and the capital gains on a particular stock; therefore, it could be consider as a good proxy of the equity's cost of capital.

We compared the estimated discount rates arising from each of the nine methods used to the observed rates of return for the same period and applied a t-test for mean

[5] For definitions of each variable, see table 1.

differences. We also divided the sample by countries and by industry sectors in order to analyze the separated effects.

Test for country and industry effects

With the estimated differences between the discount rates obtained with each method and the observed TSR, we run a simple regression model with categorical variables in order to test for Country and Industry effects. We control by variables commonly determining the cost of capital and then use categorical variables in the model to confirm country and industry effects, not explained by these variables. The final specification of our model is as follows (see equation 6):

$$R_{it} = \alpha_{it} + \beta_{it}^{L} LEV_{it} + \beta_{it}^{S} SIZ_{it} + \beta_{it}^{R} PER_{3} + \beta_{it}^{O} GROP_{it} + +\beta_{it}^{G} 5YGR_{it} + \beta_{it}^{T} TO_{it} + \sum_{j=1}^{5} \delta_j C_j + \sum_{k=1}^{8} \gamma_k I_k + \varepsilon_i \quad (6)$$

Where: Betas are the coefficients of control variables, δ_j and γ_k are the coefficients of dummy variables, which take the value of one if firm *i* belongs to country *j*, and industry *k* respectively; and, zero otherwise. The control variables are: LEV, for firm leverage; SIZ, for the logarithm of a firm's market capitalization; PER, is the price-earnings ratio; GROP, for future growth opportunities by using the proxy book to market ratio of a firm; 5YGR, for the last 5 years firm's sales average growth; and TO, for turnover, calculated by dividing the total number of shares traded over a month by the average number of shares outstanding for the month, and provided by Bloomberg.

This set of variables includes factors described by Fama & French (2012) regarding size (market capitalization and book to market rate) and value growth returns factors. We also employ a liquidity factor (turnover) provided that it is a determinant of the cost of capital (Butler, Grullon, & Weston, 2005). Finally, we include a leverage control according to the empirical evidence of capital structure and cost of capital (Graham & Leary, 2011).

Descriptive statistics

We calculated the expected annualized monthly returns for each firm using the nine methods explained above. The results for each one are summarized in Table 3.

Table 3.

Panel A. Average returns obtained under different methods and time periods

	04-05	**05-06**	**06-07**	**07-08**	**08-09**	**09-10**	**10-11**	**11-12**	**12-13**
CAPM-IB	8.30%	8.25%	7.59%	10.74%	10.08%	8.50%	8.51%	8.16%	9.05%
	(0.0083)	(0.0126)	(0.0159)	(0.0242)	(0.0227)	(0.0092)	(0.0059)	(0.006)	(0.0122)
D-CAPM	7.30%	7.59%	7.47%	11.51%	9.26%	6.24%	7.11%	4.97%	3.97%
	(0.0105)	(0.0067)	(0.0132)	(0.0262)	(0.0126)	(0.0187)	(0.0153)	(0.0111)	(0.0099)
CRM	9.19%	9.26%	9.09%	12.74%	11.02%	8.93%	8.63%	8.33%	9.95%
	(0.0118)	(0.0116)	(0.0184)	(0.0348)	(0.0314)	(0.0102)	(0.0062)	(0.0056)	(0.0163)
G&E	15.30%	19.21%	23.91%	83.51%	45.10%	16.86%	13.85%	17.99%	16.38%
	(0.0328)	(0.0138)	(0.066)	(0.5643)	(0.1194)	(0.0382)	(0.042)	(0.0595)	(0.0405)
LESSARD	7.17%	7.83%	7.73%	9.60%	7.31%	7.65%	7.02%	6.78%	8.73%
	(0.0172)	(0.0262)	(0.0375)	(0.023)	(0.0138)	(0.0133)	(0.0103)	(0.0091)	(0.0157)
GLOBAL	9.12%	9.34%	1.92%	-0.12%	-10.65%	5.28%	5.93%	3.74%	4.12%
	(0.0165)	(0.0159)	(0.0321)	(0.0889)	(0.1645)	(0.0315)	(0.0243)	(0.0233)	(0.0182)
LOCAL	15.35%	14.77%	15.75%	14.79%	19.66%	17.31%	12.87%	10.75%	13.40%
	(0.0318)	(0.0467)	(0.0399)	(0.0706)	(0.0474)	(0.0228)	(0.0404)	(0.0192)	(0.0216)
HYBRID	11.06%	11.33%	2.80%	1.50%	-13.06%	8.73%	8.93%	6.35%	7.34%
	(0.0115)	(0.0133)	(0.0378)	(0.0983)	(0.2292)	(0.0406)	(0.0289)	(0.0312)	(0.0253)
ICAPM	2.51%	5.44%	8.99%	1.42%	0.09%	3.94%	7.36%	6.05%	8.36%
	(0.0539)	(0.0441)	(0.0633)	(0.0687)	(0.1262)	(0.0709)	(0.0579)	(0.0493)	(0.0848)

Note: The average of the annualized monthly-expected return is presented in the first row. The standard deviation of expected average return is in the 2nd row in parenthesis.

Panel B. Median returns obtained under different methods and time periods

	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13
CAPM-IB	8.37%	8.67%	7.53%	11.95%	9.64%	8.36%	8.67%	8.06%	9.09%
D-CAPM	7.56%	7.33%	6.92%	11.36%	8.67%	5.59%	6.55%	4.39%	3.54%
CRM	9.12%	9.46%	9.12%	11.57%	10.11%	8.72%	8.65%	8.36%	9.93%
G&E	16.08%	19.08%	21.47%	45.37%	43.74%	15.64%	12.29%	16.69%	16.14%
LESSARD	7.09%	8.50%	8.40%	9.34%	7.08%	7.56%	6.93%	6.86%	8.27%
GLOBAL	9.14%	9.13%	3.01%	3.11%	-5.26%	5.71%	6.14%	2.95%	3.31%
LOCAL	15.87%	12.64%	14.51%	13.57%	18.35%	17.67%	11.29%	10.51%	13.27%
HYBRID	10.57%	11.11%	4.19%	5.57%	-2.11%	9.99%	9.12%	5.56%	6.33%
ICAPM	2.10%	5.17%	8.09%	2.21%	-1.19%	3.50%	7.36%	6.32%	12.53%

Note: The median of the annualized monthly-expected return is presented for all the methods and each period.

We include in panel A, the annualized average expected returns for each method, and in panel B the median of annualized expected returns. Differences between those tables show that the results of the method of Godfrey & Espinosa are clearly skewed. However, results for most of the methods actually are skewed, for the period 2007 to 2009, during the global financial crisis.

As Table 3 shows, the method of Godfrey & Espinosa produced the highest cost of equity for all the periods considered (annualized average monthly returns). This is particularly evident during the 2007-2008 global financial crises. According to Estrada (2007), in this model the specific nature of the firm is ignored and the only variable for measuring risk depends on the country in which the firm is based. Particularly, what is evaluated is the ratio of the volatility of the local market against the volatility of the benchmark market. As expected, during the referred period, such volatility is particularly large. This ratio observed considerably higher values from 2006 to 2009, and particularly for countries like Brazil and Argentina and, to a lesser extent, for Chile and Peru.

The Local CAPM yielded higher rates than the average of the nine methods, perhaps due to the higher local betas, calculated against the local market portfolios. On the other hand, it is interesting the behavior of the Global and the Hybrid methods since they produced negative expected rates, because when calculated, a big number of global betas were negative. This perhaps occurred due to the composition of the MSCI World Index[6], which could have had negative covariance with emerging markets. According to Damodaran (2012), companies from Emerging Markets consistently have lower betas when calculated against global indexes, than companies from developed markets. This is a nonsense result because no investor would expect a negative return on any investment.

Results for CAPM-IB, CRM, D-CAPM and Lessard show the least volatile and very similar results. This is somewhat expected given that all of them are based in the same set of inputs, as the risk free rate and the market risk premium, and they only differ in the form that Betas are measured.

Results

Our main interest in this paper is to find the differences between expected (predicted) cost of equity rates yielded by each method and observed stock returns; and to find whether they can be explained by country and industry factors. We calculate the

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[6] The MSCI World Index consists of the following 23 developed market country indexes (2014): Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom, and the United States. Further information at: http://www.msci.com/products/indexes/tools/#TOTALRET

monthly difference between the annual rates calculated by using each of the methods described before, and the total observed stock return, as proxy for the observed return on equity. To make the comparison of the contemporaneous results statistically reliable, we applied a *t* test for the mean differences[7] between those expected and observed returns (see table 4).

Table 4.

Mean differences between the estimated cost of equity using each method and the observed Total Stock Return, for the entire sample

	04-05	**05-06**	**06-07**	**07-08**	**08-09**	**09-10**	**10-11**	**11-12**	**12-13**
CAPM-IB	-23.0***	-15.0***	-17.0***	0.56	24.7***	-4.7	-11.0***	8.72**	13.8***
D-CAPM	-24.0***	-16.0***	-17.0***	1.36	21.6***	-7.1	-13.0***	5.38	8.52***
CRM	-22.0***	-14.0***	-16.0***	2.41	23.5***	-4.3	-11.0***	8.93**	14.6***
G&E	-16.0***	-5.0***	-1.3	73.1***	57.5***	3.6	-6.2*	18.6***	21.1***
LESSARD	-24.0***	-16.0***	-17.0***	-0.7	19.7***	-5.6	-13.0***	7.38**	13.4***
GLOBAL	-22.0***	-14.0***	-23.0***	-10.0*	1.83	-7.9	-14.0***	4.35	8.85***
LOCAL	-16.0***	-9.4***	-9.5***	4.46	32.1***	4.05	-7.2**	11.3***	18.1***
HYBRID	-20.0***	-12.0***	-22.0***	-8.8	-0.5	-4.5	-11.0***	6.95**	12.0***
ICAPM	-29.0***	-18.0***	-16.0***	-8.9	12.5*	-9.3	-12.0***	6.66*	13.0***

Note: We report the t-statistics test for mean differences between the results of each of the different methods and the Total Stock Return (TSR) including the entire sample for the different periods considered. We run an F-Test (not reported) for variances between samples and we found different variances at statistically significant levels.

Legend: * p<0.10; ** p<0.05; *** p<0.01

Results show a change in the differences between the expected and observed discount rates for the period considered. We distinguish four periods; first, from 2004 to

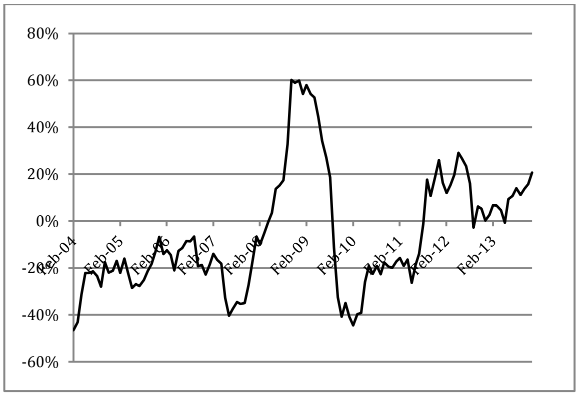
[7] We also run an F test for variances (not reported here) and it showed that the variances were statistically different at 1 percent.

2007, when expected (predicted) rates were lower than TSR, then differences are negative. Second, from 2008 to 2009, in which return rates sharply raise and peak at the highest levels, making differences markedly positive. The third period from 2009 to 2011 is again characterized by negative differences, at the same levels as the 2004 to 2007 period, with a slight increase at the end of 2011. It is important to notice that after the financial crisis (2008-2009) the differences between rates obtained by different methods and observed stock returns were the smallest, specifically during 2009-2010. However, none of the results were statistically significant in such period. The fourth period, from 2012 to 2013, show positive differences in average for the expected return rates calculated with all the methods, compared with the total stock return.

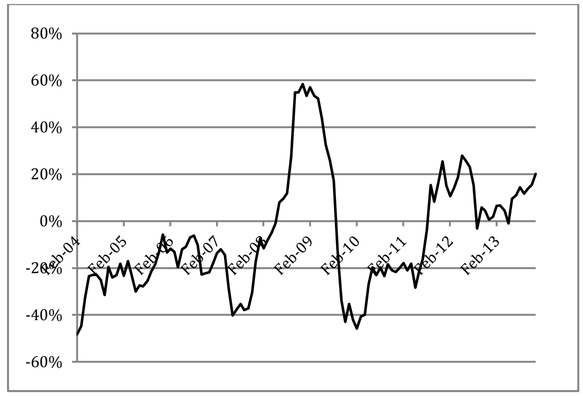
Intuition would indicate that before the global financial crisis, methods for calculating expected return rates did not incorporate adequately the market risk; then, during the crisis, all of them produced higher return rates due to the uncertainty and prevailing volatility. The last two of our four periods seem to be a correction stage when methods produce higher expected return rates.

These differences are better understood by using graphs, since one would expect that the difference between each method and the observed TSR were oscillating towards zero through time. However, we found differences in levels between methods (see Figure 1).

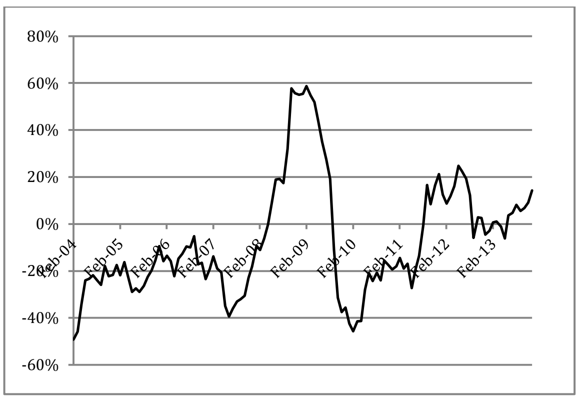
CAPM-IB



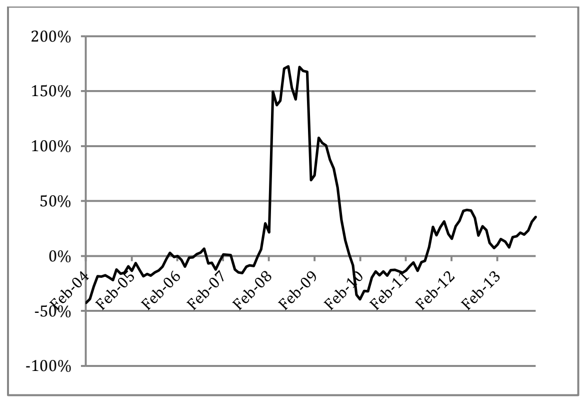
CRM



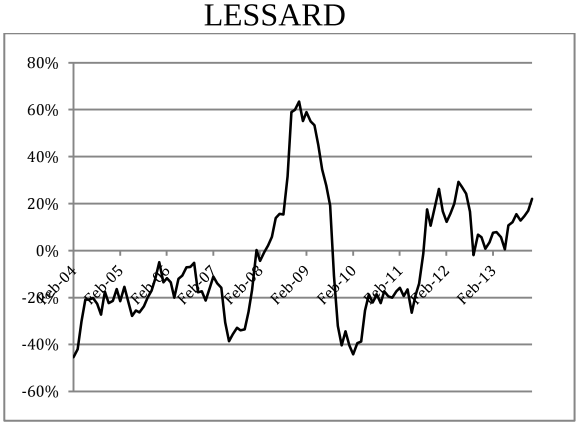
D-CAPM



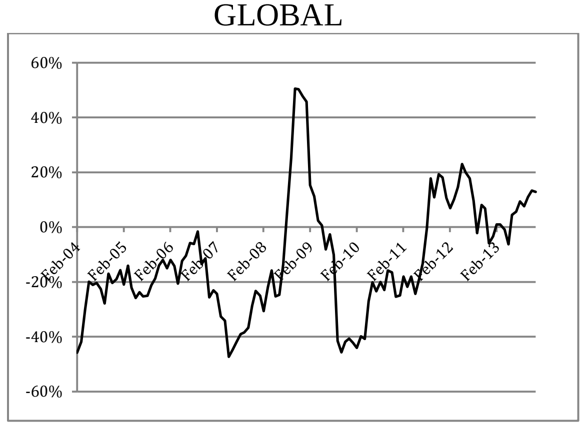
GODFREY & ESPINOSA



LESSARD



GLOBAL



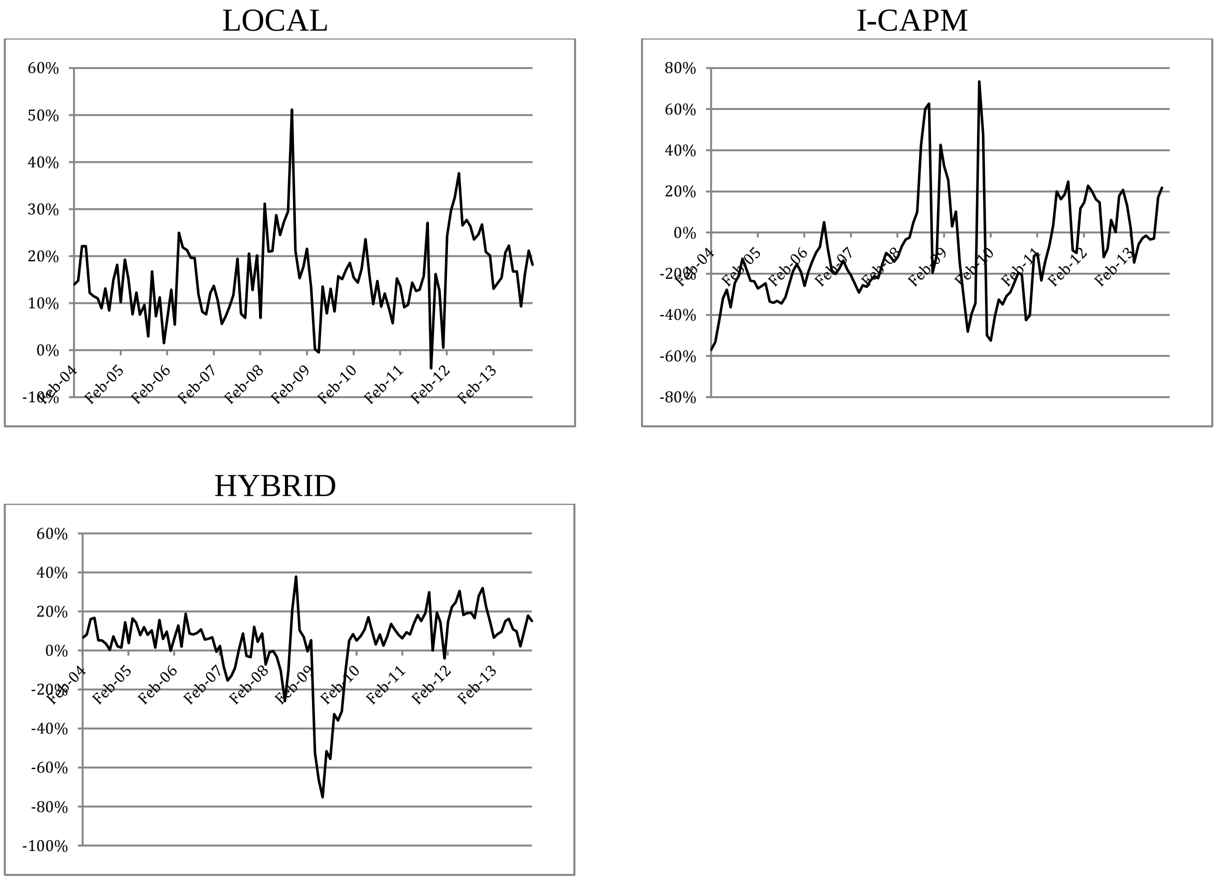


Figure 1. Differences between average expected returns obtained by using each method and observed total stock return

Note: We plot the monthly differences between the expected results obtained with each method employed and the observed Total Stock Return, for the entire sample between the years 2004 to 2013. Source: Own elaboration by using Bloomberg data

It is evident the high correlation between the results obtained with the CAPM-IB and D-CAPM, CRM and LESSARD. This leads us to conclude that it would be better to use the CAPM-IB (compared to these three other methods) given its simplicity, and taking into account that CAPM-IB is one of the most popular methods for estimating the expected equity return in emerging markets[8]. Therefore, the other methods yield similar results and are much more complicated to apply. This correlation is more evident when plots are overlapped (see Figure 2).

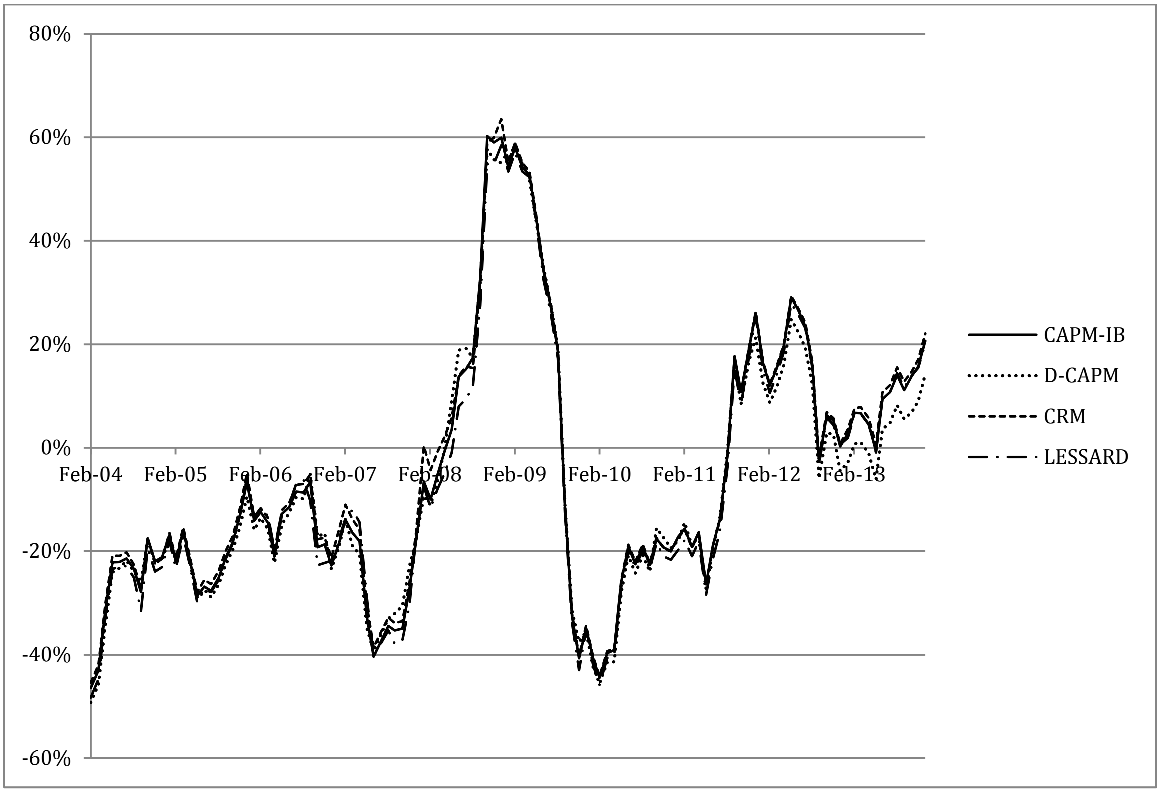


Figure 2. Differences between four methods modifying the Beta

Note: We plot the difference between the methods modifying the Beta Factor (CAPM-IB, D-CAPM, CRM and Lessard), excepting the method of Godfrey & Espinosa, for the entire sample with monthly frequency, during the years 2004 to 2013. Source: Own elaboration.

The method of Godfrey & Espinosa yields quite high estimated return rates for the years of the financial crisis (2007 to 2009). This method assumes a fixed correlation

[8] References of this fact is not are not only found in the academic literature (Cruces, Buscaglia, & Alonso, 2002; Mishra & O'Brien, 2001), but also in nonacademic articles, which are commonly written for practitioners (KPMG Valuations Group, 2013; New South Wales Government, 2007).

between stock prices and the market portfolio, and thus it leaves the risk depending on the relation between the volatility of each stock and the volatility of the market portfolio. In particular, this period was associated with a historically high stock volatility (Schwert, 2011). Then, the relation between standard deviations would be higher than in the other periods considered, as stated in section 3.

On the other hand, the Local CAPM yields considerable overestimations of the returns, at the end of our sample period. As stated above, there are several problems when calculating the expected rates with this method. First of all, it is necessary to standardize the local indexes to avoid any bias related to the form of weight of each local index. Regarding such bias, we use standard MSCI local indexes. Secondly, local markets (in the case of Latin America) are small and have liquidity problems (Romero-Álvarez, Ramírez-Atehortúa, & Guzmán-Aguilar, 2013). Particularly, in emerging markets, liquidity is a key driver of stock returns, and liquidity shocks are positively related with stock return shocks (Bekaert, Harvey, & Lundblad, 2007).

When separated by countries, differences between expected and observed cost of equities show important discrepancies in the magnitude of the mean differences for each method (see Table 5, panel A).

Table 5.

Panel A. Mean differences between the estimated cost of equity using the CAPM-IB and each method by country

	AR	BZ	CL	CO	MX	PE
CAPM-IB	0.0834	-0.0512***	-0.0231***	-0.0454***	-0.0445***	-0.0484***
	(0.2744)	(0.4340)	(0.2634)	(0.2474)	(0.2714)	(0.2552)
D-CAPM	-0.0329***	-0.0421***	-0.0309***	-0.0759***	-0.0604***	-0.0561***
	(0.2550)	(0.6102)	(0.2791)	(0.2502)	(0.2624)	(0.2694)
CRM	0.1245	-0.0402***	-0.0230***	-0.0443***	-0.0415***	-0.0458***
	(0.2990)	(0.4343)	(0.2634)	(0.2484)	(0.2714)	(0.2555)
CAPM-GE	0.2293	0.4057	0.0976	0.0921	0.0808	0.2595
	(0.3228)	(10.7377)	(0.6105)	(0.3660)	(0.3155)	(2.0830)
LESSARD	-0.0111**	-0.0528***	-0.0268***	-0.0607***	-0.0389***	-0.0550***
	(0.2689)	(0.7689)	(0.2688)	(0.2481)	(0.2892)	(0.2584)
GLOBAL	-0.0581***	-0.1338***	-0.0590***	-0.1012***	-0.0921***	-0.1842***
	(0.2807)	(1.7440)	(0.2866)	(0.3110)	(0.2940)	(1.3991)
LOCAL	0.1629	0.0683	-0.0309***	-0.0031	-0.0040	0.0084*
	(0.3063)	(0.5906)	(0.2902)	(0.2649)	(0.2908)	(0.2803)
HYBRID	0.0096*	-0.1173***	-0.0529***	-0.0787***	-0.0789***	-0.2089***
	(0.2992)	(2.0782)	(0.3035)	(0.3416)	(0.3136)	(1.9182)
ICAPM	0.0047	-0.0885***	-0.0704***	-0.0774***	-0.0727***	-0.1599***
	(0.3249)	(0.4018)	(0.2873)	(0.2774)	(0.2955)	(0.9252)

Note: We report the t-statistics test for mean differences between the results of the different methods and the observed Total Stock Return, including the entire sample, divided by country for 2004-2013. Standard Deviations are included in parenthesis.

Legend: * p<0.10; ** p<0.05; *** p<0.01

Panel B. Mean differences between each method's estimation and the total stock returns sorted by industry

	Basic Materials	Commu- nications	Consumer, Cyclical	Consumer, Non- cyclical	Diversified	Energy	Financial	Industrial	Technology	Utilities
CAPM-IB	-0.2258***	-0.1422***	-0.1030***	0.1537	-0.2649***	-0.2480***	-0.0978***	0.1510	0.1083	0.0826
	(0.4659)	(0.2842)	(0.3488)	(0.4007)	(0.1264)	(0.23468)	(0.2001)	(0.1630)	(0.1005)	(0.0809)
D-CAPM	-0.1917***	-0.1609***	-0.1167***	0.1514	-0.2876***	-0.2889***	-0.1384***	0.1170	0.0890	0.0628
	(0.9509)	(0.0772)	(0.2704)	(0.3614)	(0.09617)	(0.0988)	(0.1879)	(0.1331)	(0.0812)	(0.0573)
CRM	-0.2168***	-0.1315***	-0.0945***	0.1620	-0.2574***	-0.2296***	-0.0910***	0.1598	0.1203	0.0933
	(0.4688)	(0.2872)	(0.3511)	(0.4044)	(0.1357)	(0.2484)	(0.2038)	(0.1709)	(0.1203)	(0.0994)
CAPM-GE	0.6869	0.0552	0.1032	0.3262	-0.1214	-0.0232**	0.0255	0.3360	0.2727	0.2075
	(18.1996)	(0.7232)	(0.5468)	(0.5374)	(0.2351)	(0.35241)	(0.2957)	(0.8800)	(0.1899)	(0.1759)
LESSARD	-0.2494***	-0.1459***	-0.1152***	0.1349	-0.2735***	-0.2723***	-0.0953***	0.1482	0.0840	0.0678
	(0.9099)	(0.4493)	(0.6505)	(0.4893)	(0.1401)	(0.3117)	(0.2126)	(0.2212)	(0.0829)	(0.0699)
GLOBAL	-0.3672***	-0.1892***	-0.1706***	0.1045	-0.3215***	-0.3317***	-0.1771***	0.0709	0.0473	0.0377
	(3.0404)	(0.1765)	(0.3438)	(0.4306)	(0.1708)	(0.2586)	(0.2457)	(0.2552)	(0.1483)	(0.1192)
LOCAL	-0.1377***	-0.0357**	-0.0345***	0.2116	-0.2197***	-0.1436***	-0.0582***	0.1998	0.1623	0.1357
	(0.1856)	(1.0482)	(0.3888)	(0.3732)	(0.3082)	(0.2061)	(0.2496)	(0.4599)	(0.1534)	(0.2147)
HCAPM	-0.3781***	-0.1632***	-0.1550***	0.1217	-0.3050***	-0.2936***	-0.1608***	0.0862	0.0801	0.0632
	(3.7033)	(0.3281)	(0.3843)	(0.5011)	(0.2075)	(0.2883)	(0.2866)	(0.3068)	(0.1686)	(0.1492)
ICAPM	-0.2755***	-0.2042***	-0.1591***	0.1160	-0.3089***	-0.2877***	-0.1658***	0.0773	0.0562	0.0474
	(0.6000)	(0.2651)	(0.3838)	(0.4422)	(0.2672)	(0.2720)	(0.3143)	(0.2569)	(0.1891)	(0.2637)

Note: We report the t-statistics test for mean differences between the results of each of the different methods and the observed Total Stock Return, including the entire sample, divided by industry for 2004-2013. Standard Deviations are included in parenthesis.

Legend: * p<0.10; ** p<0.05; *** p<0.01

For five of the nine methods, the differences are not statistically significant in the case of Argentina. On the other hand, differences have a contrary behavior for this country than the average. For example, CAPM-IB, CRM, HYBRID and ICAPM overestimate the discount rates for Argentina, while it underestimates them for other countries. This country has special features. First of all, the local index has just thirteen stocks in its main basket. Second, local market data for the risk-free rate are not available in the databases we used. Additionally, Argentina's official inflation rate has received considerable criticism and has been suspected of being severely manipulated since some private companies offer different data.[9] We employed official data since it was retrieved from Datastream.

Regarding the results for the method of Godfrey & Espinosa, they reinforce our contention above, on the volatility of local markets. This volatility with respect to the benchmark market (U.S.) is very different between the countries in the sample. From our proxy for country risk premium, the Credit Default Swaps, one can observe the particular variation of country risk during global financial crisis (see Figure 3). On the other hand, it would be necessary to assess the impact caused by stocks' liquidity on these different results. In the studies we reviewed, liquidity is an important variable, even more than those related to market integration in emerging markets. For example, Bekaert, Harvey, & Lundblad (2007) found that liquidity is an important driver of expected returns.

[9] Data gathered by private companies use a methodology similar to that of the National Bureau of Statistics. However, this information is not official.

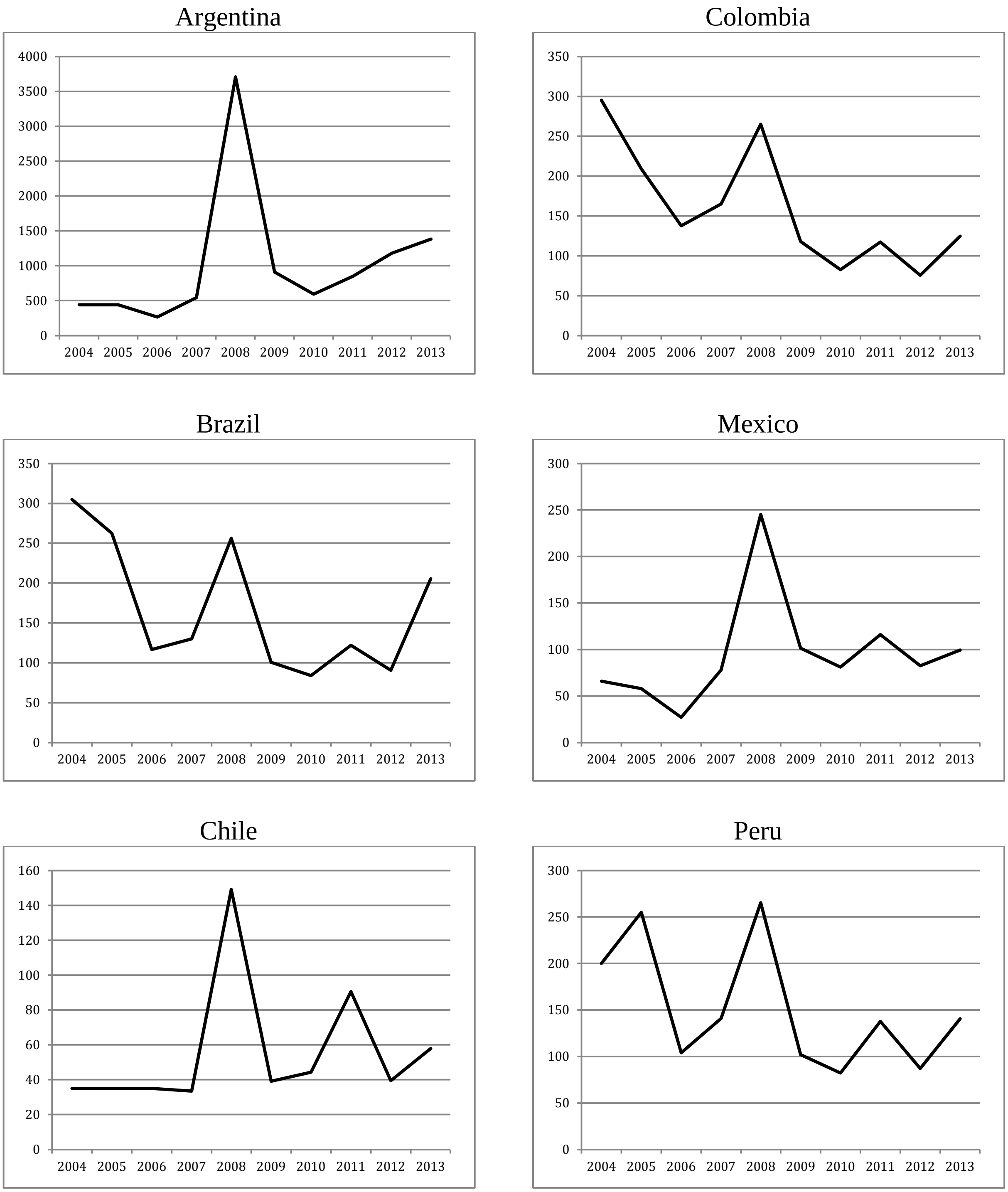


Figure 3. Credit Default Swaps for Latin American Countries

Note: Annualized average in basis points. Source: Datastream

For the entire period, the Local CAPM presents the lowest differences with observed stock returns; however those differences are just statistically significant for Chile and weakly statistically significant for Peru. The most important contention here is the integration vs. segmentation of markets, according to which it would be recommendable for these countries to use Local CAPM, since they are not efficiently integrated (Figueroa, 2014). Torre, Ize & Schmuckler (2012) consider that Latin American markets are underdeveloped; in spite of financial liberalizations of markets during nineties, integration process remained unchanged. A recent research has demonstrated that emerging markets are not fully integrated (Donadelli & Prosperi, 2012).

In the case of the ICAPM, results for Peru indicate an important negative difference between the expected and the observed return rate, compared with the rest of the countries. This value is related to the sensibility of the prices to the exchange rate. It is necessary to notice that the Peruvian currency has suffered a revaluation episode during our considered period (see Figure 4). However, this is not the only country that presented this situation; it was similar for Brazil, Chile and Colombia.

When sorting the data for industry, we find heterogeneous results among the methods, as shown in Table 5, panel B. We found that none of the results in the Industrial, Technology, Utilities and Consumer (Non-Cyclical) sectors was statistically significant. Industry represents around 70 firms in average per year, Utilities about 70, Consumer (Non-Cyclical) 80, and Technology just 5 in average. However, the addition of these firms represents an important proportion of our sample.

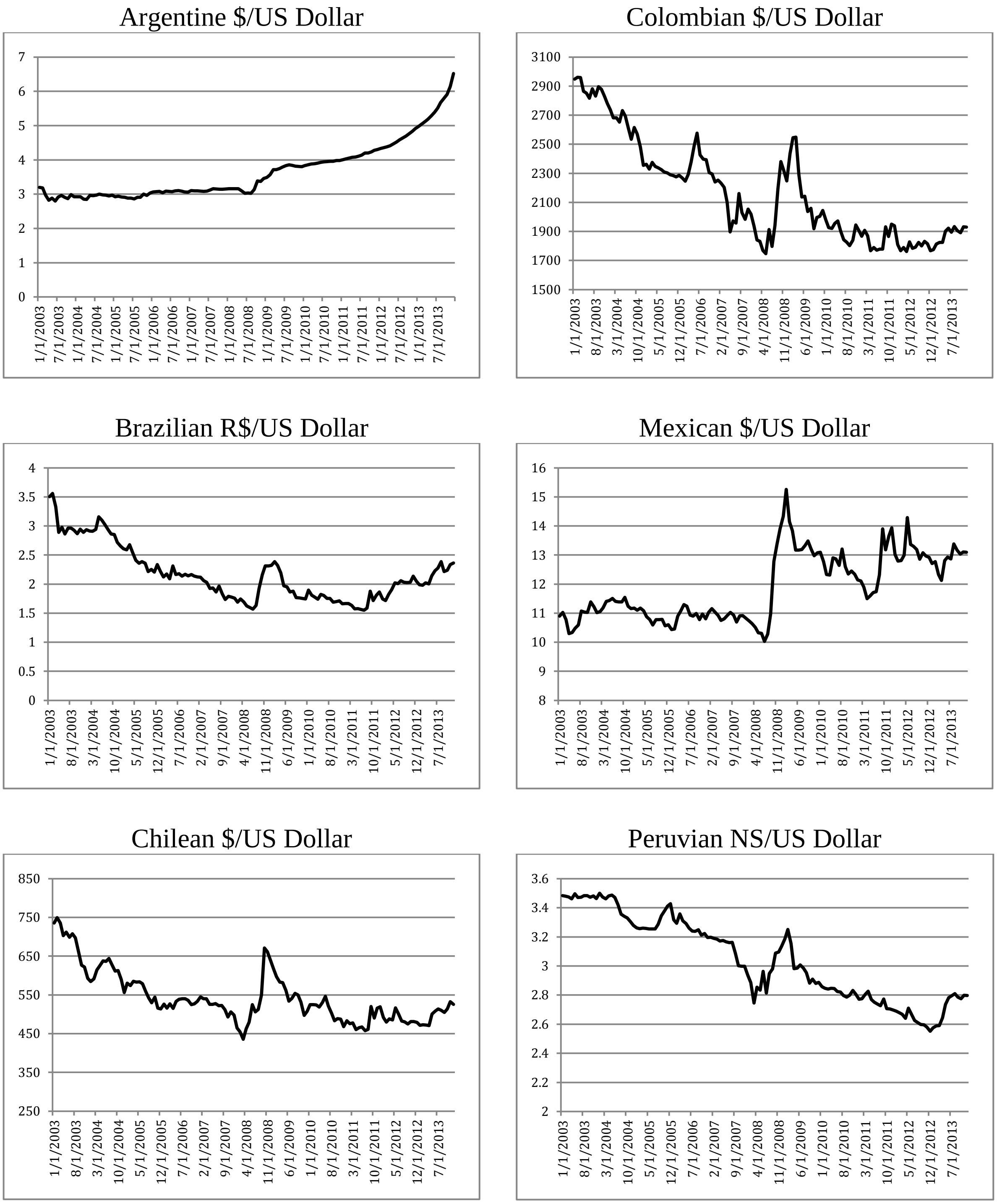


Figure 4. Latin American countries Exchange Rate

Note: Exchange rate Local Currency/Dollar. Source: Latin American Central Banks

On the other hand, the method of Godfrey & Espinosa is just statistically significant at 5% level for Energy sector. In particular, this sector is the smallest one in our sample, with no more than 15 firms in average by year.

Statistically significant results by industry in this table show consistent positive differences between the expected and observed discount rates for all the methods. This is particularly evident in the Basic Materials sector where differences are larger in absolute value, in average compared with other sectors.

This analysis shows the importance of country and industry-specific factors when choosing a method to calculate the cost of equity in emerging markets. It is also interesting to note that, beyond the CAPM-IB, practitioners do employ some methods that correct for country or industry risk. The main objective of this work is not to rate any of the current models but to compare each of them against the observed TSR. Our results shed light on the need to incorporate country and industry-specific factors in further theoretical development of models, as we will show next.

Test for industry and country effects

We run a Robust Ordinary Least Squares (OLS) regression with Random Effects, in order to test the determinants of the differences between expected and observed return rates (see Table 6). We correct for heteroscedasticity by using the Huber (1967) and White (1980) robust estimate of variance.

Table 6.

Determinants of the differences between expected and observed discount rates

	CAPM-IB	D-CAPM	CRM	CAPM-GE	LESSARD	GLOBAL	LOCAL	HYBRID	ICAPM
LEVERAGE	0.0114***	-0.0002	0.0113***	-0.0039	0.0321***	-0.0003	0.0000	-0.0002	-0.0003***
	(70.81)	(-0.50)	(67.56)	(-0.78)	(47.22)	(-0.88)	(0.23)	(-0.68)	(-3.06)
SIZE	-0.0045**	0.0049	-0.0058***	0.1018**	-0.0081***	-0.0167**	-0.0119***	-0.0206**	0.0069*
	(-2.21)	(1.10)	(-2.76)	(2.00)	(-3.46)	(-2.24)	(-5.80)	(-2.42)	(1.93)
P/E RATIO	0.0000*	0.0000*	0.0000*	0.0000	0.0000	0.0000	-0.0000*	0.0000	-0.0000
	(1.67)	(1.73)	(1.68)	(0.52)	(1.59)	(1.05)	(-1.86)	(1.38)	(-1.22)
G: OPPORT	0.0006	0.0005	0.0007*	-0.0009	0.0004	0.0019**	-0.0001	0.0023***	0.0037**
	(1.48)	(1.09)	(1.66)	(-0.22)	(0.88)	(2.09)	(-0.44)	(2.63)	(2.51)
5Y GROWTH	0.0000**	-0.0000***	0.0000**	-0.0000***	0.0000***	0.0000**	-0.0000***	0.0000**	0.0000
	(2.37)	(-3.36)	(1.97)	(-2.75)	(2.85)	(2.35)	(-4.51)	(2.16)	(0.44)
TURNOVER	-0.0004	0.0013	-0.0001	-0.0208	0.0012	0.0051	0.0024**	0.0072*	0.0047***
	(-0.50)	(1.34)	(-0.15)	(-1.54)	(1.38)	(1.59)	(2.47)	(1.81)	(3.44)
Constant	-0.0110	-0.1123***	0.0008	-0.3616*	-0.0682***	-0.0301***	0.0579***	-0.0169*	-0.1947***
	(-0.66)	(-3.94)	(0.04)	(-1.71)	(-3.52)	(-2.69)	(3.50)	(-1.88)	(-8.13)
Observations	38253	38253	38173	38113	38173	38253	37617	37701	28175
Chi^2	5081.1794	24.7542	4622.6215	18.4876	2258.3817	51.3746	64.0689	62.3449	66.1896
Rho	0.3058	0.1957	0.3070	0.0496	0.2527	0.0036	0.3198	0.0000	0.2190

Note: We run a robust OLS Random Effects panel regression to test the determinants of the differences between the calculated expected return rates with each method, and the observed ones by the Total Stock Return proxy.

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

From table 6 P/E Ratio is a not statistically significant determinant of the differences between expected and observed rates of return, for any of the methods analyzed. The same conclusion was reached for Growth Opportunities measured by Market to Book ratio proxy (what is just statistically significant for one method).

Once we tested the determinant of the differences, we run the same regression by adding dummy variables by country and industry (see Table 7).

Results indicate that industry effects are more important than country effects, not only in magnitude but also in statistical significance. As observed, country effects are statistically significant for some countries when differences are compared with specific methods. For example, the case of Argentina shows statistical significance of country specific effects when using multifactor models, as well as local and global CAPM. On the other hand, industry effects are statistically significant for most of the sectors and for most of the methods employed. This contrasts with findings in related literature, in which country effects are larger than industry effects (Ye Bai et al., 2012; Heston & Rouwenhorst, 1995; M.-H. Lee & Hooy, 2013); but it is in line with other literature where industry effects prevail on country effects (Y. Bai, 2014; Eiling, Gerard, & De Roon, 2012; Ferreira & Ferreira, 2006).

Table 7.

Industry and country effects test by using dummy variables

Variable	CAPM-IB	D-CAPM	CRM	CAPM-GE	LESSARD	GLOBAL	LOCAL	HYBRID	ICAPM
Leverage	0.0114***	-0.0000	0.0114***	-0.0026	0.0315***	0.0002	0.0001	0.0002	-0.0001
Size	-0.0023*	0.0078**	-0.0027*	0.1133**	-0.0059***	-0.0050	-0.0067***	-0.0066	0.0077***
P/E Ratio	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000**	0.0000	-0.0000
G. Opport	0.0008**	0.0003	0.0009**	-0.0016	0.0005	-0.0004	-0.0002	-0.0005	0.0033***
5y Growth	0.0000**	-0.0000***	0.0000**	-0.0000***	0.0000***	0.0000**	-0.0000***	0.0000**	0.0000
Turnover	0.0001	0.0013	0.0002	-0.0175	0.0009	0.0066*	0.0026***	0.0081*	0.0036***
Argentina	0.1068***	0.0227	0.1511***	0.0578	0.0434***	0.0551***	0.1509***	0.1116***	0.1352***
Brazil	0.0037	0.0030	0.0147	-0.0367	0.0500***	-0.0029	0.0514**	0.0007	0.0287
Chile	0.0009	0.0528**	0.0012	0.1910***	0.0420***	0.0170*	-0.0297	-0.0007	0.0462**
Mexico	0.0008	0.0129	0.0042	-0.0448	0.0471***	0.0110	0.0198	0.0056	0.0361*
Peru	0.0034	0.0186	0.0056	-0.1407	0.0282**	0.0353	0.0246	0.0245	-0.0124
Financial	-0.2074***	-0.2340***	-0.2091***	-0.3581***	-0.2323***	-0.2147***	-0.1954***	-0.2135***	-0.1997***
Industrial	0.0538***	0.0310**	0.0533***	0.0926*	0.0617***	0.0217**	0.0344	0.0160	0.0394
Basic Materials	-0.3066***	-0.2758***	-0.3046***	0.5405	-0.3006***	-0.4060***	-0.2757***	-0.4259***	-0.3050***
Communications	-0.2423***	-0.2541***	-0.2404***	-0.3310***	-0.2485***	-0.2379***	-0.2242***	-0.2385***	-0.2694***
Diversified	-0.3722***	-0.3791***	-0.3750***	-0.4377***	-0.3910***	-0.3599***	-0.3282***	-0.3579***	-0.3316***
Energy	-0.3480***	-0.3940***	-0.3448***	-0.6720***	-0.3348***	-0.3468***	-0.3131***	-0.3447***	-0.3497***
Utilities	-0.0227***	-0.0312**	-0.0226**	-0.1286***	-0.0266***	-0.0145*	-0.0028	-0.0125	-0.0035
Cons, Cyclical	-0.1934***	-0.2082***	-0.1953***	-0.2192***	-0.1918***	-0.2167***	-0.1972***	-0.2189***	-0.1949***
Cons, Non-C.	0.0608***	0.0521***	0.0593***	-0.0741	0.0613***	0.0720***	0.0619**	0.0740***	0.0640**
Constant	0.0769***	-0.0186	0.0779***	-0.4493*	0.0032	-0.0046	0.1076***	0.0104	-0.1033***
Observations	38253	38253	38173	38113	38173	38253	37617	37701	28175
Chi^2	2.69e+04	4926.1568	2.46e+04	1310.7626	1.18e+04	1.98e+04	2415.7101	1.57e+04	1313.6082
Rho	0.0242	0.1186	0.0269	0.0506	0.0248	0.0000	0.1034	0.0000	0.0730

Note: We run a robust OLS Random Effects panel regression to test the determinants of the differences between the calculated expected return rates with each method, and the observed ones by the Total Stock Return proxy. Additionally, we employ dummy variables by country and by industry.

Legend: * p<0.10; ** p<0.05; *** p<0.01

Regression results for dummy variables by industry are more important, not only in magnitude but in statistical significance. They give us an idea about the existence of industry specific effects, not included in the systematic risk measures of the methods employed to calculate the discount rates. Fama & French (1997) found imprecise results from the CAPM model between industries, related to what they call *true factor risk premiums*. Moreover, Gebhardt, Lee, & Swaminathan (2001) argue that the cost of capital of a firm depends on its industry membership.

Most of the industries exhibit a negative impact on results, except for the Industrial sector. On the other hand, country effects, in spite of having a positive sign, resulted not statistically significant, except for the case of Argentina. These findings are important for our paper since we are trying to determine whether country and industry effects affect the differences between expected and observed cost of equity return rates.

As a complementary analysis, we run a robust panel OLS regression by doing interactions between country and industry dummies (see Table 8). Interactions results are statistically significant for all methods. This gives us an idea about the importance of country and industry effects as determinants of the differences between expected and observed discount rates. This has an implication for practitioners when selecting a method to calculate the expected return rate for any project. For example, an investor valuating a project in an industrial sector could obtain very large differences if he uses the CAPM-IB vs. the Local CAPM if the project is developed in Brazil or in Mexico (3% compared with 12%, in average).

Table 8.

Industry and country effects test by using interacting dummy variables of country and industry

Variable	CAPM-IB	D-CAPM	CRM	CAPM-GE	LESSARD	GLOBAL	LOCAL	HYBRID	ICAPM
Leverage	0.0114***	-0.0001	0.0114***	-0.0028	0.0317***	0.0003	0.0001	0.0003	-0.0001
Size	-0.0021	0.0086**	-0.0026*	0.1264**	-0.0054***	-0.0048	-0.0072***	-0.0065	0.0084***
P/E Ratio	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000*	0.0000	-0.0000
G. Opport	0.0008*	0.0004	0.0008*	-0.0002	0.0004	-0.0012	-0.0002	-0.0015	0.0033***
5Y Growth	0.0000***	-0.0000***	0.0000***	-0.0000***	0.0000***	0.0000***	-0.0000***	0.0000***	0.0000
Turnover	-0.0000	0.0015	0.0001	-0.0151	0.0008	0.0067**	0.0026***	0.0083**	0.0037***
(AR)(FI)	-0.1462***	-0.2455***	-0.1215***	-0.4097	-0.2725***	-0.1801**	-0.0655	-0.1276	-0.1177**
(AR)(BS)	-0.2131***	-0.3284***	-0.1679***	-0.3441	-0.2800***	-0.2890***	-0.1644***	-0.2411**	-0.1973***
(AR)(CT)	-0.1476***	-0.2784**	-0.1130***	-0.4810	-0.2381***	-0.2415**	-0.0863	-0.2032	-0.2028***
(AR)(DV)	-0.2826***	-0.3389*	-0.2902***	0.0834	-0.4315***	-0.3472*	-0.2756***	-0.3058	-0.2679**
(AR)(EN)	-0.2635***	-0.4022***	-0.2245***	-0.6551	-0.3362***	-0.3243***	-0.1971***	-0.2717**	-0.2957***
(AR)(UT)	0.0783***	-0.0259	0.1142***	-0.0778	-0.0141	0.0211	0.1225***	0.0668	0.0552
(AR)(CoC)	-0.0930***	-0.1789*	-0.0730**	-0.0206	-0.1906***	-0.1759*	-0.0968*	-0.1301	-0.1029
(AR)(CoNC)	0.1385***	0.0613	0.1678***	0.1601	0.0515*	0.0980	0.1567***	0.1437	0.1460***
(AR)(IN)	0.1392***	0.0463	0.1718***	0.1827	0.0715**	0.0766	0.1161**	0.1209	0.1525***
(BR)(FI)	-0.2194***	-0.2671***	-0.2234***	-0.7423	-0.2134***	-0.1985***	-0.1681***	-0.1939**	-0.2184***
(BR)(IN)	0.0324	0.0089	0.0291	-0.1756	0.0580**	0.0208	0.0372	0.0126	0.0135
(BR)(BS)	-0.3350***	-0.2269***	-0.3335***	1.6312*	-0.3178***	-0.5658***	-0.2759***	-0.6210***	-0.3473***
(BR)(CT)	-0.2589***	-0.2848***	-0.2571***	-0.6168	-0.2423***	-0.2336***	-0.2069***	-0.2372***	-0.3004***
(BR)(DV)	-0.3843***	-0.3876***	-0.3877***	-0.6567	-0.3886***	-0.3152***	-0.3077***	-0.3021***	-0.3225***
(BR)(EN)	-0.3599***	-0.3915***	-0.3592***	-0.6361	-0.3315***	-0.3608***	-0.3004***	-0.3756***	-0.3408***
(BR)(UT)	-0.0379*	-0.0510	-0.0400*	-0.3517	-0.0256	-0.0129	0.0136	-0.0118	-0.0031
(BR)(CoC)	-0.2149***	-0.2415***	-0.2183***	-0.4538	-0.1887***	-0.2342***	-0.1957***	-0.2399***	-0.2309***
(BR)(CoNC)	0.0490**	-0.0044	0.0452**	-0.5470	0.0709***	0.0903	0.0674*	0.0962	0.0231
(CL)(FI)	-0.2330***	-0.1969***	-0.2461***	0.0144	-0.2261***	-0.2363***	-0.2887***	-0.2679***	-0.2149***
(CL)(IN)	0.0340	0.0612	0.0214	0.3837	0.0483**	0.0148	-0.0146	-0.0189	0.0462
(CL)(BS)	-0.3221***	-0.3050***	-0.3350***	-0.2532	-0.3027***	-0.3263***	-0.3547***	-0.3547***	-0.3175***
(CL)(CT)	-0.2672***	-0.2212**	-0.2803***	-0.0394	-0.2510***	-0.2702***	-0.3091***	-0.2977***	-0.2732***
(CL)(DV)	-0.3977***	-0.3574***	-0.4100***	-0.2532	-0.3961***	-0.3933***	-0.4285***	-0.4250***	-0.3822***

(CL)(UT)	-0.0503**	-0.0095	-0.0629***	0.0516	-0.0379	-0.0380	-0.0805**	-0.0679	-0.0256
(CL)(CoC)	-0.2090***	-0.1695**	-0.2226***	0.0320	-0.2025***	-0.2159***	-0.2560***	-0.2468***	-0.1952***
(CL)(CoNC)	0.0434**	0.1185	0.0296	0.2645	0.0540**	0.0552	0.0071	0.0274	0.0775*
(CO)(FI)	-0.2093***	-0.2431**	-0.2220***	-0.2766	-0.3215***	-0.2352**	-0.2442***	-0.2473*	-0.2420***
(CO)(IN)	-0.0159	-0.0474	-0.0321	-0.1142	-0.0135	-0.0606	-0.0527	-0.0801	-0.0755
(CO)(EN)	-0.3553***	-0.4801***	-0.3710***	-1.5896	-0.3419***	-0.2662*	-0.3488***	-0.2538	-0.4061***
(CO)(UT)	-0.0611*	-0.0566	-0.0747*	-0.1516	-0.0658	-0.0547	-0.0290	-0.0656	-0.0767
(CO)(CoC)	-0.2235***	-0.2336	-0.2364***	-0.2661	-0.2009***	-0.2701	-0.2191**	-0.2891	-0.2566**
(CO)(CoNC)	0.0455	0.0804	0.0362	0.1900	0.0589	0.0572	0.0482	0.0488	0.0491
(MX)(FI)	-0.2156***	-0.2235**	-0.2252***	-0.2374	-0.2257***	-0.2515***	-0.2301***	-0.2706***	-0.2187***
(MX)(IN)	0.0362	0.0198	0.0268	0.0349	0.0774***	-0.0159	0.0269	-0.0411	0.0024
(MX)(BS)	-0.3233***	-0.3255***	-0.3333***	-0.2933	-0.2956***	-0.3147***	-0.2539***	-0.3265***	-0.3044***
(MX)(CT)	-0.2654***	-0.2714***	-0.2745***	-0.4541	-0.2651***	-0.2735***	-0.2622***	-0.2918***	-0.2687***
(MX)(DV)	-0.3978***	-0.3888***	-0.4077***	-0.4776	-0.3920***	-0.3725***	-0.3756***	-0.3873***	-0.3585***
(MX)(CoC)	-0.2128***	-0.2037**	-0.2228***	-0.1886	-0.1868***	-0.2243***	-0.2075***	-0.2427***	-0.2131***
(MX)(CoNC)	0.0282	0.0412	0.0181	-0.0314	0.0471*	0.0408	0.0228	0.0224	0.0381
(PE)(FI)	-0.2402***	-0.2217**	-0.2510***	-0.2681	-0.3477***	-0.2441***	-0.2248***	-0.2744**	-0.2817***
(PE)(IN)	0.0617**	0.0478	0.0530*	0.0904	0.0835**	0.0067	-0.0071	-0.0227	-0.0635
(PE)(BS)	-0.3149***	-0.3261***	-0.3253***	-0.4000	-0.2905***	-0.3421***	-0.2848***	-0.3747***	-0.3527***
(PE)(CT)	-0.2656***	-0.1668	-0.2744***	0.3853	-0.2617***	-0.1584	-0.2369***	-0.1716	-0.3668***
(PE)(DV)	-0.3840***	-0.4117***	-0.3968***	-0.8000	-0.3872***	-0.3447***	-0.1982***	-0.3644**	-0.3056***
(PE)(EN)	-0.4089***	-0.4105**	-0.4199***	-0.6201	-0.4246***	-0.3652**	-0.3665***	-0.3800*	-0.4649***
(PE)(UT)	-0.0462*	-0.0184	-0.0572**	0.0011	-0.0371	-0.0182	-0.0548	-0.0373	-0.1042*
(PE)(CoC)	-0.2130***	-0.1687	-0.2218***	0.0821	-0.1965***	-0.2401	-0.1889***	-0.2674	-0.1160
(PE)(CoNC)	0.0347	0.0449	0.0233	-0.1285	0.0512*	0.0805	0.0490	0.0638	-0.0111
Constant	0.0999***	-0.0047	0.1140***	-0.5419	0.0497**	0.0172	0.1520***	0.0410	-0.0552

*Note***:** We run a robust OLS Random Effects panel regression to test the determinants of the differences between the calculated expected return rates with each method, and the observed ones by the Total Stock Return proxy. Additionally, we employ interacting dummy variables by country and industry.

Legend: * $p<0.10$; ** $p<0.05$; *** $p<0.01$

Although we are not suggesting which method is better, our argument is that the use of one versus another method could lead, in certain industries and countries, to make wrong financial decisions.

Conclusions and implications

This paper had two main objectives: first, to compare and analyze the results yielded by nine cost of equity estimation methods with stock returns observed in Latin American markets; and second, to evaluate the impact of country and industry effects on estimated discount rates.

Our analyses of the mean differences between the cost of equity obtained with nine estimation methods and the Total Stock Return as proxy for observed equity rates, show that there are regularities among the methods, depending on the period when data is annualized. There are noticeably differences in the results before, during and after the 2007-2008 global financial crises. Results would indicate that before the crises none of the methods incorporated the dimensions of risk in an accurate way. During the global financial crises, inputs of the different methods dramatically increased the expected return rates, making the differences considerable positive between those expected rates and observed total stock returns. In the last span of time considered it seems that the methods overestimated the risk and predicted higher rates of return when compared with total stock returns.

An interesting case in the analysis of results was the Local CAPM. In particular, this method tends to produce relatively high expected (predicted) cost of equity returns. When separated by country and by industry this method did not show regularity. In this regard, it is necessary to appeal to the segmented or integrated markets hypothesis. The same conclusion is applicable to the hybrid methods. This debate continues, and the results obtained in this study could be attributed to the lack of integration of the Latin American markets. If so, the valuation of firms in these markets should give more importance to the local CAPM rather than the CAPM-IB, as stated Von Henner (2008), for whom Local CAPM has practical limitations but is theoretically justified. For Bruner et al. (2002) segmentation of markets requires an adaptation of global factors to a local features of risk to be captured by models of valuation.

It is evident the close correlation between the results yielded by four methods: CAPM-IB, D-CAPM, CRM and LESSARD. Their results are very similar and practitioners would benefit by the simplicity of the CAPM-IB in relation to the other much more sophisticated and difficult to implement methods.

The method of Godfrey and Espinosa modifies the Beta by assuming a correlation between the stock and the market portfolio equal to 0.6 for all equities. Its results present very high expected return rates during the crisis and during the next current period. As stated above, during this period markets suffered relatively high volatility and this modified Beta depends only on the rate of volatility of the stock and the market portfolio volatility. One can conclude that results from this method are particularly sensible to the volatility experimented by markets in periods of financial crisis.

The multifactor methods, the Hybrid model and the ICAPM, yield the more volatile results. In the first case, it combines the effect from global and local factors. It is clear that during the crisis and in the next current period, global and hybrid method presented higher volatility, due to the global market volatility. Regarding the ICAPM, this volatility could be explained by the fact that it combines the effect of global factor and exchange rate factor. This last one has remarkable volatility in the region due to the volatility of the exchange rate.

When data is separated by sector and country at the same time, outcomes are equally important as aggregated results. There are several differences between industries and countries across the methods. These differences are contradictory with the base literature on country and industry effects, whose main contention is that country effects prevail over industry effects. However, no final word has been said in this regard, it continues the puzzle of integration/segmentation of markets (Koedijk, Kool, Schotman, & Van Dijk, 2002) and we contribute with our findings to this debate.

In practice, heterogeneous results among methods showed here present a challenge to practitioners making equity cost estimations. Depending on the country or the sector being evaluated, large differences will be found among the available methods. We just showed one example on the results for one sector and a number of countries when investors are evaluating a project. Interactions between country and industry dummy variables reinforce our arguments here.

However, we found that industry effects are more important than country effects in Latin America. Although we cannot claim our research favors of any of the methods studied, we do show the danger of considering just one and ignoring the impact of the others; especially given the important impact of country and industry specific factors.

Chapter 2 Determinants of the spread between the yield to maturity of corporate and sovereign debt in emerging markets

Introduction

There are several papers on the determinants of the 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). However, there are fewer articles on the determinants of the spread between the yield of corporate debt issued by firms from emerging markets (EMs) against the yield of the respective sovereign debt.

According to Peter & Grandes (2005) there exists an extensive empirical literature that assess the determinants of government yield spreads in EMs. Nevertheless, the scope of their research does not take in account the relation between both, sovereign and corporate default risks. Earlier research (Peter & Grandes, 2005; Briceño & Rivero, 2012) found that the most important determinant of the risk of corporate default for firms from emerging markets is sovereign risk. However, they show that there are other determinants including firm specific factors.

We use a dataset of corporate and sovereign bonds retrieved from Bloomberg in order to find 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 debts.

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 fully explained in the current literature. 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.

Literature review

Determinants of sovereign spread

Baldacci, Gupta, & Mati (2008) define country risk premiums as the sovereign bond spreads (spread between the yield to maturity of debt issued by a certain country and the yield to maturity of debt issued by a benchmark country, for example, the U.S. when debt is issued in U.S. dollars). 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 that fiscal and political factors are the key determinants of country risk.

For Bellas, Papaioannou & Petrova (2010) macroeconomic variables are the main determinants of sovereign spreads in the long-run, but financial volatility is the main determinant in the short-run. They used data from 14 emerging markets in a panel set from 1997 to 2009, with quarterly frequency. 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, along with macroeconomic factors, in emerging markets 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) uses a dataset covering monthly zero-coupon interest rates for Germany, Switzerland, the U.K., and the U.S. from January 1975 to December 2009. They worked with maturities of one month, three months, and one to five years for each country. Their methodology is also a dynamic factor analysis, as proposed by Cochrane & Piazzesi (2009). Dahlquist & Hasseltoft studied the influence of local factors in bond risk premiums across international bond markets. This contrasts with findings of Westphalen (2001), who considers that there is a systematic risk factor further than just country risk, termed ‘sovereign bond market factor’ (Westphalen, 2001, pg. 22). Nonetheless, the author remarks that whether corporate bond market influences this factor needs to be tested.

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 by using ordinary least squares (OLS) regressions. Though this is not the scope of our research, they find that credit ratings have independent influence on credit spreads and are positively correlated with macroeconomic factors.

Martinez, Terceño & Teruel (2013) and Terceño et al. (2013) study the determinants of the sovereign spread for seven Latin American countries by using a panel data framework. They test for the effects of the recent international crisis in 2008, and found the existence of contagion effects across these markets during such crisis.

In general, the literature on sovereign spreads finds that macroeconomic fundamentals are the most important determinants of such spread. Along these findings, some researchers also consider country specific factors as being determinants of the spread, as well as fiscal and political factors, invertor’s risk attitude or the terms of trade volatility. Another string of the literature has found that credit ratings are significant in explaining the sovereign spread.

The influence of sovereign risk

Theoretically, according to a string of the literature, private debt should be riskier than sovereign debt. In other words, the credit rating of a sovereign bond issue must be a ceiling for a corporate one (Cuadra, Sanchez, & Sapriza, 2010) in the same country. 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. They 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 the 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 not only the effect of sovereign rating changes on bonds, but in stocks as well. They find that there is a contagion effect regarding changes in sovereign debt ratings in the regions studied; but 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 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. 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.

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 find as one of the determinants of the corporate spread, the yield of the sovereign debt of a certain country against a benchmark.

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 in (Elton, Gruber, Agrawal, & Mann, 2002; Durbin & Ng, 2005; King & Khang, 2005).

On one hand, Elton et al. (2002) examined the corporate and government bonds included in the Lehman Brothers Fixed Income Database (currently, the Barclays Fixed Income Database), and 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, credit ratings only explain a small fraction of the spread; and 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 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 sector (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 exploited the Option Adjusted Spread data from Bloomberg in a panel data framework, between years

1999 to 2006. Moreover, they decomposed the variance and found 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, in the second one, the 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 (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. 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' contention refers 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 prove that effectively such specific factors actually exists.

A note on the corporate-sovereign debt spread estimation The majority of the papers use a matching methodology to estimate the spread. Bonds are selected and matched by using the maturity date. Authors search for bonds, which have similar maturities and have been 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[10] (Miler, 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. In a previous work 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 primarily by the spread of a sovereign debt from another sovereign debt that is risk free (usually the U.S.

[10] OAS analyzes the cash flows associated to a bond with the market's interest rates and with the values of the embedded options against the market volatility.

T-Bonds). We consider that a more important source of country risk could be found from the spread between corporate and sovereign debt.

The data and the methodology

Provided that there are different classifications of emerging markets, we decide to use the MSCI emerging markets list, in order to have a standardized source of data when looking for market information for each country in our sample. Its constituents are currently 21 countries: 5 from Latin America, 8 from Asia, 5 from Europe and 3 from Africa. However, we include all the countries belonging to this Index between the first quarter of 2004 and the last quarter of 2013. They are the following 22 countries: Argentina, 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 that have been issued in U.S. Dollars, to allow for direct comparisons. When we exclude 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) 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 provides standardized 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[11]. We ended up with 339 corporate bonds from 13 emerging markets (see Table 9).

Table 9

Number of bonds included in our sample by country.

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

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

[11] 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.

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[12], 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.

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 we use later.

Descriptive statistics indicates 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.; it is similar to "between" standard deviation (of 210 b.p.), in contrast with "within" standard deviation (of around 60 b.p.)

[12] YAS automatically selects the benchmark that better fits the term structure of a corporate bond.

From the descriptive statistics, it is interesting that we find negative minimum values, which indicates that some of the corporates in our dataset do not accomplish the ‘sovereign ceiling rule’; specifically in the case of Chile. On the other hand, some of the bonds show spreads of more than 1,000 bp; 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 10a).

Table 10

Panel A. Descriptive statistics by country

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

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

Panel B. Descriptive statistics by industry

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

Note: Net spread by industry in basic points

We also separated the data by industry and results do not show large differences in average, but high variability between sectors (see table 10b). 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 5). Peaks are observed during 2007 to 2008, at the time of global financial crises.

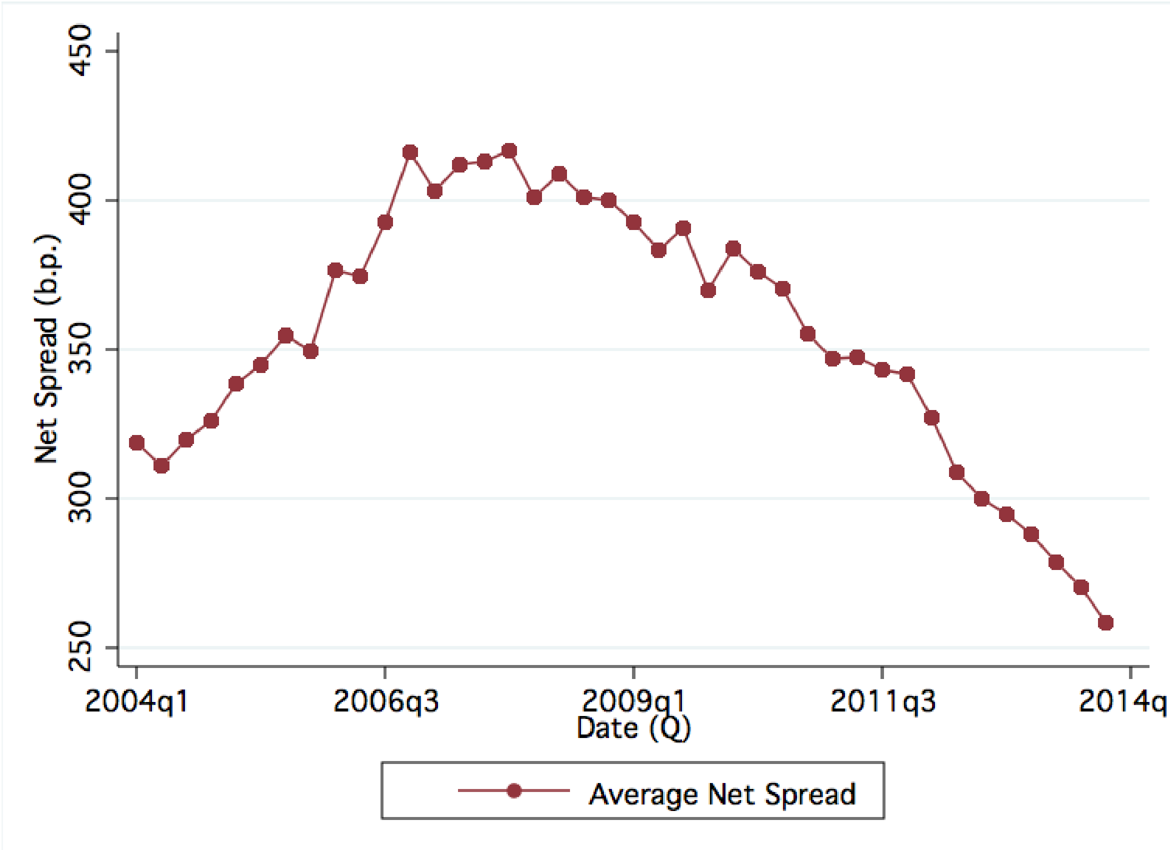


Figure 5. Average Net Spread

Note: This is the average net spread for the pooled data by year, in basic points

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 6).

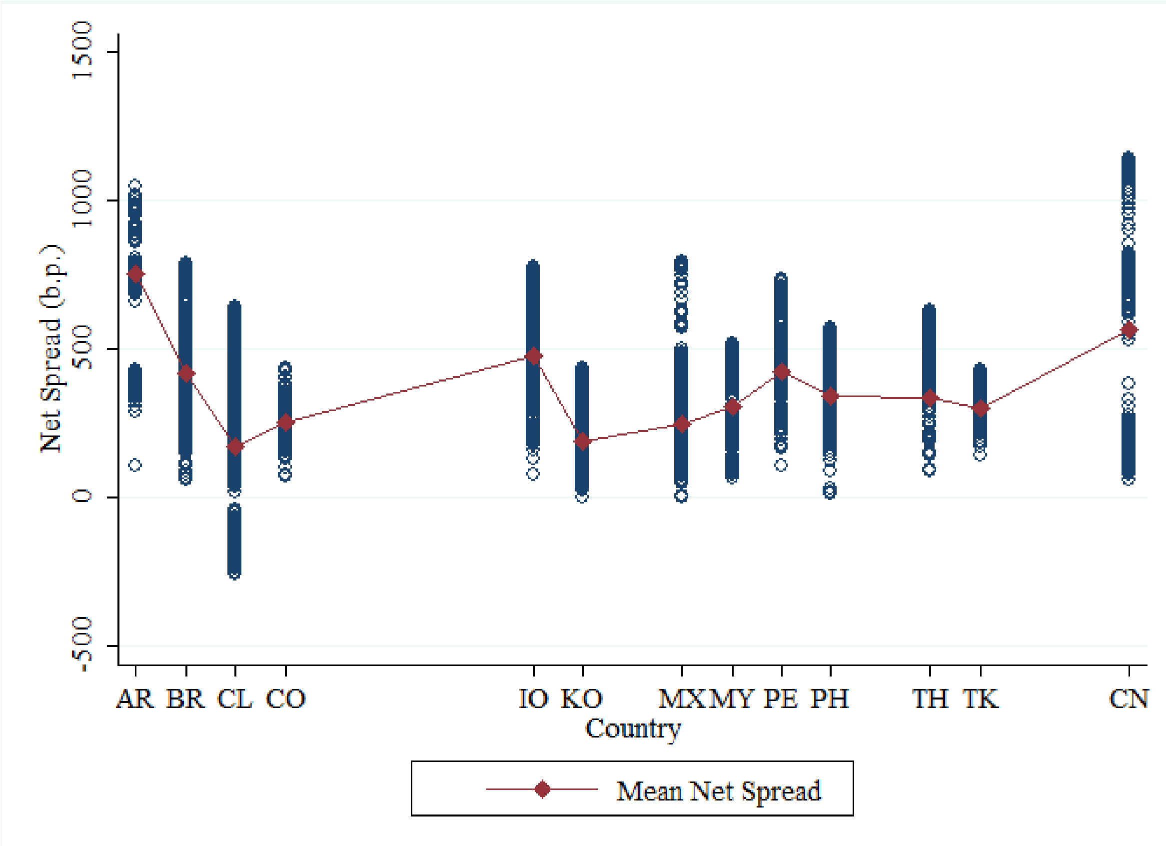


Figure 6. Net Spread by country

Note: 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

In general, when plotted, the net spread exhibits a high volatility, particularly after the global financial crises (i.e. after 2008). This contrast with results shown in figure 1 regarding a decrease of the net spreads (see figure 7).

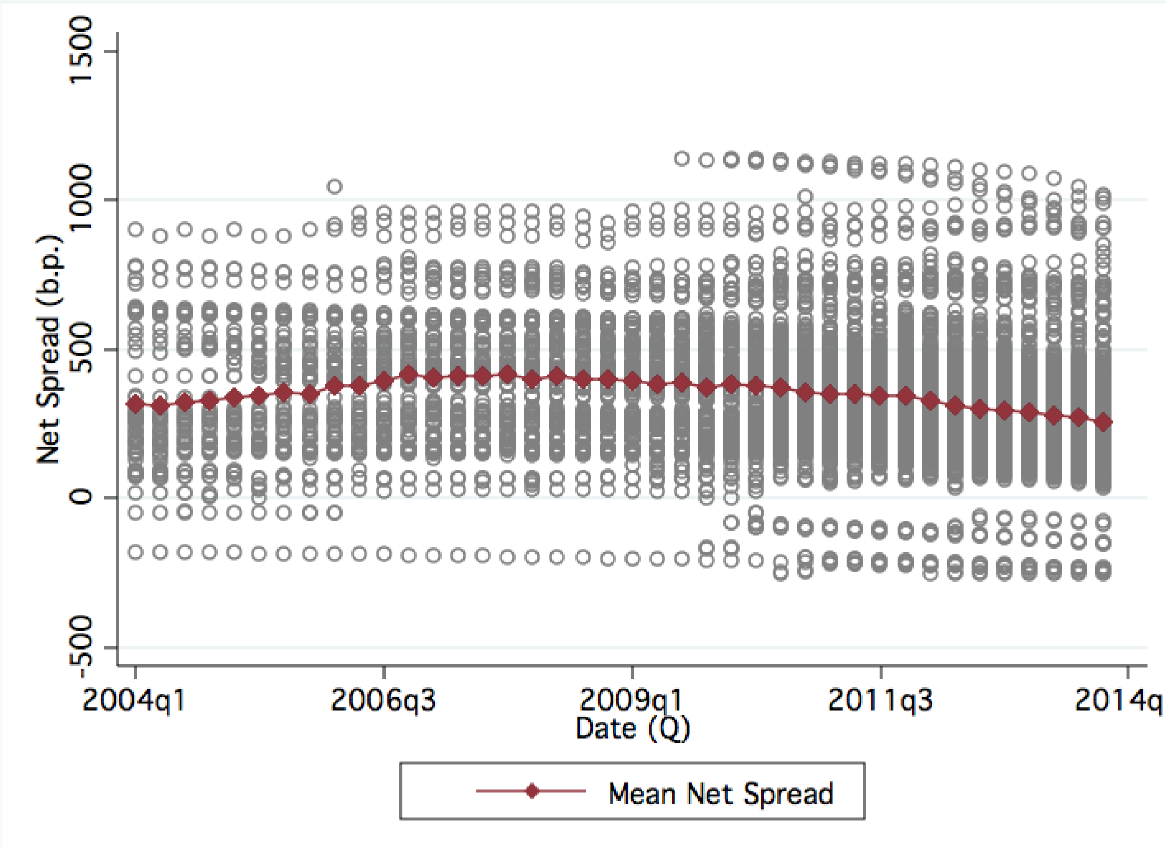


Figure 7. Net Spread by date

Note: Hollow circle represents individual average observations within a quarter; connected diamonds are the average by quarter, from 1st quarter 2004 to fourth quarter 2013.

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 (see equation 7):

$$NS_{it} = \beta\vec{F}_{it} + \gamma_1\vec{B}_{it} + \gamma_1\overrightarrow{BF_i} + \delta\vec{C}_t + \omega\vec{G}_t + \varepsilon_{it} \tag{7}$$

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 charateristics, $\vec{C}$ represents country specific macroeconomic variables, and $\vec{G}$ is a vector of global controls. Each group of variables is described as follows:

- The vector of firm characteristics $\vec{F} = \{DY, LEV, GRW, ROE, SIZ, EV\}$ is completely time variant. The variables are DPS: 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 $\vec{B} = \{TM, MHR, LEV \times TM\}$ contains bond specific features. TM: is the time remaining 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, 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).

- The vector $\overrightarrow{BF} = \{MOD, AMM\}$ refers to time invariant characteristics of the issue. MOD: is the initial Moddy'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 public[13] 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[14]; 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.

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 Ordinary Least Square (OLS) Pooled regression, to find statistical significance in our set of variables (see Table 11).

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[13] It refers to the government debt, not to the fact that such debt is being publicly traded.

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

Table 11.

Determinants of Net Spread

	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

Note: 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)

The first 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 treat 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 number (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 12).

Table 12.

Specifications recommended for unbalanced panel

	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	

Note: 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)

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): on one hand, 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 in order to check for the presence of heteroskedasticity. We found a χ^2_{82} statistic of 44500 which indicates the presence of heteroskedasticity, and challenges us to correct this problem. Then, we 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 13). The reason is that Baltagi (2008) recommends REML for strongly unbalanced panels.

Table 13.

Determinants of Net Spread (RE vs. FE)

	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

Note: 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)

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, to test for the effects not included in the coefficients explained above (see Table 14). 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).

Table 14.

Determinants of Net Spread with dummy variables

	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

Note: Dependent variable is the Net Spread (in 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)

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 and to obtain more reliable results.

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.

Robustness checks

We first run an F-test in order to establish that our dummy variables are statistically different from zero. Results 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 consider introducing variables for controlling by 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 (see Table 15).

Table 15.

Determinants of Net Spread with country and industry controls

	FE Regression	**FE Vector Decomposition**
Dividend Yield	1.11	1.11**
	(-0.57)	(-2.14)
Leverage	3.36	3.36***
	(-1.25)	(-11.12)
Growth	-0.25	-0.25***
	(-1.03)	(-3.96)
ROE	-0.13	-0.13
	(-0.15)	(-0.54)
Size	14.81	14.81***
	(-0.53)	(-16.85)
Equity Vol.	4.33	4.33***
	(-1.55)	(-13.2)
T. Maturity	28.20**	28.20***
	(-2.32)	(-24.45)
Moody's History	0.65	0.65***
	(-1.02)	(-4.49)
(Lev)(T. Mat)	-0.50*	-0.50***
	(-1.69)	(-12.75)
Moody's Initial	.	-7.58***
	.	(-21.33)
Amount	.	21.44***
	.	(-5.94)
Public Debt	-37.31	-37.31***
	(-1.55)	(-27.74)
Financial Risk	0.34***	0.34***
	(-2.7)	(-3.69)
C. Bank Rate	0.81	0.81
	(-0.25)	(-0.79)
CPI	-0.63	-0.63
	(-0.27)	(-0.71)
VIX	0.76	0.76***
	(-0.91)	(-4.41)
US 10y Yield	6.7	6.70***
	(-1.04)	(-2.68)
MSCI Local Index	31.83	31.83***
	(-0.87)	(-41.2)
MSCI-EM Industry	-38.06	-38.06***
	(-0.96)	(-8.09)
Constant	-26.76	-26.76
	(-0.03)	(-0.33)
Observations	754	754
Adjusted R^2	0.31	0.93
F Test	7.22	516.85
RMSE	38.41	38.49

Note: Dependent variable is the Net Spread (in b.p.). MSCI country and industry Indexes are included. Data from 1Q-2004 to 4Q-2013. Legend: * p<0.10; ** p<0.05; *** p<0.01 (t statistics in parentheses)

Results contrast with previous regressions with dummy variables but not specific country and industry controls. First, it must be noticed that 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 corporates in different countries or even different industries (see Table 16).

As observed, 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, just 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.

Table 16.

Effect of amount issued by country and industry

	Panel regression robust
Dividend Yield	-0.19
	(-0.11)
Leverage	3.24
	(-1.18)
Growth	-0.2
	(-0.86)
ROE	-0.04
	(-0.05)
Size	4.48
	(-0.28)
Equity Vol.	5.02**
	(-2.45)
T. Maturity	26.24**
	(-2.19)
Moody's History	0.43
	(-0.7)
(Lev)(T. Mat)	-0.49
	(-1.63)
Moody's Initial	-14.35***
	(-4.60)
Amount	-95.56**
	(-2.03)
Public Debt	-18.44
	(-1.27)
Financial Risk	0.42***
	(-3.74)
C. Bank Rate	3.5
	(-1.06)
CPI	-1
	(-0.41)
VIX	0.93
	(-1.07)
US 10y Yield	3.97
	(-0.68)
MSCI Local Index	-1.87
	(-0.14)
MSCI-EM Industry	-37.35
	(-0.84)
(Amount)(Indonesia)	3.74
	(-0.56)
(Amount)(Mexico)	8.84*
	(-1.88)
(Amount)(Financial)	7.00**
	(-2.33)
(Amount)(Consumer Goods)	4.46
	(-1.47)
(Amount)(Utilities)	11.84***
	(-4.42)
(Amount)(Comm. & Tech)	8.39***
	(-3.29)
Constant	2739.07***
	(-4.52)
Observations	754
RMSE	41.92

Note: Dependent variable is the Net Spread (in b.p.). Interactions between amount issued and some countries and industries are included. Data from 1Q-2004 to 4Q-2013. Legend: * p<0.10; ** p<0.05; *** p<0.01 (t statistics in parentheses)

Conclusions and implications

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 et al., 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 valuating their projects of issuing bonds in the public market.

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Appendix

Hamada's Equation

Hamada empirically found that the systematic risk of a levered firm is greater than an unlevered one. This transformation can be obtained from Miller & Midigliani's proposition II:

$$R_E = R_A + (R_A - R_D)(1 - \tau_C)\frac{D}{E} \qquad (8)$$

Where R_A is the return for the unlevered firm, R_D is the cost of debt, and τ_C is the corporate tax rate.

Provided that one can estimate the returns of the unlevered firm, the levered firm and the debt by using the CAPM, and using the respective Betas unlevered, levered and debt's beta, respectively:

$$\mathrm{R_E = r_f + (R_M - r_f)\beta_L} \qquad (9)$$

$$\mathrm{R_A = r_f + (R_M - r_f)\beta_U} \qquad (10)$$

$$\mathrm{R_D = r_f + (R_M - r_f)\beta_D} \qquad (11)$$

By replacing (9) and (10) in equation (11):

$$\beta_L = \left[1 + (1 - \tau_C)\left(\frac{D}{E}\right)\right]\beta_U + \frac{r_f - R_D}{R_M - r_f}(1 - \tau_C)\left(\frac{D}{E}\right) \qquad (12)$$

By assuming that firms can access the risk free rate, the expression simplifies as:

$$\beta_L = \left[1 + (1 - \tau_C)\left(\frac{D}{D}\right)\right]\beta_U \qquad (13)$$

However, when firms cannot access the risk free rate, one can obtain:

$$\beta_L = \beta_U + (\beta_U - \beta_D)(1 - \tau_C)\left(\frac{D}{E}\right) \qquad (14)$$

It is expected that $\beta_U > \beta_D$ and, therefore, $\beta_L > \beta_D$. If β_D were observable, this transformation would be used for more accurate levered betas' results. However, as stated by Berk & DeMarzo (2014), it is almost impossible to calculate the Betas of debt due to the scarce and unreliable information on the individual securities.

Biography

John Rosso joined the Doctoral program in Management, major in finance, at Universidad de Los Andes in August, 2010. He has also been Assistant Professor at the same school. He is full time Associate Professor at the Business Administration School – Universidad Pedagogica y Tecnologica de Colombia, where he was the Administrative and Finance Vice-Rector and previously the director of the research center at the faculty of economics.

He has a Master degree in Economics and Financial Administration from Universidad Tecnologica de Pereira, where he also received a Bachelor Degree in Industrial Engineering. He attended a graduate program in Higher Education at Universidad del Valle.

John was born in Cartago, Valle. His wife is Fanny Salamanca. He also has three children, Laura, Mathias and Valentina.