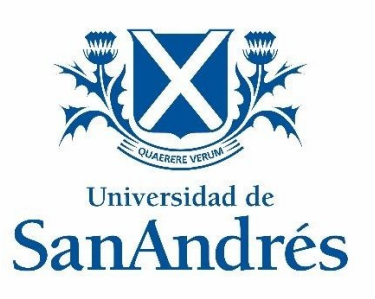

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Country Risk and the Cost of Equity in Emerging Markets

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Tesis de Maestría en Economía de

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"El riesgo país y el costo de capital en mercados emergentes"

Resumen

En este trabajo se evalúa la significatividad estadística del riesgo país como variable en una serie de modelos de costo de capital basados en el CAPM, para los siete mercados emergentes más grandes para los cuales se ha podido obtener datos. Asimismo, se evalúa el supuesto frecuentemente usado en la práctica financiera de incorporar el riesgo país de manera aditiva con un coeficiente igual a uno en modelos de valuación de capital. Solamente en México y Brasil se encuentran primas de riesgo significativamente diferentes de cero para el riesgo país. Sumar la prima de riesgo con un coeficiente de uno no parece ser válido en general e, inclusive, el mismo pareciera tomar valores negativos para Brasil y México. Este resultado es consistente con la idea de que inversores internacionales podrían buscar exposición al riesgo país en estos mercados.

Palabras clave: Mercados emergentes, retornos al capital, CAPM, riesgo país, riesgo de deuda soberana.

"Country Risk and the Cost of Equity in Emerging Markets"

Abstract

In this paper, we evaluate whether the country risk variable is a significant risk factor in several CAPM based models of expected equity returns in the seven larges emerging markets for which data is available. We also test the assumption that is usually made by financial practitioners that the country risk can be added with a coefficient value of one. Only in Brazil and Mexico the risk premium associated with the country risk factor is a significant factor. Adding country risk with a coefficient value of one is not generally valid and moreover, in Brazil and Mexico the risk premium for country risk takes a negative value. This provides evidence that international investors may look for exposure to the country risk.

Keywords: Emerging Markets; Equity Returns; CAPM; Country Risk; Sovereign credit risk.

Códigos JEL: E43, G30, G12, G15.

1 Introduction

Is there empirical support for the extended practice of adding the country risk variable into expected equity return models in emerging markets? Financial practitioners use several models to value emerging markets stock prices. Most of these models are based on the CAPM and rely on the spreads of sovereign bonds, usually called country risk[1], as a key rate. However, there is neither a generally accepted theoretical model which supports this practice, nor a broad body of empirical evidence behind it, as has been pointed out by Harvey (2001), Estrada (2007) and Andrade (2008). This paper tests the empirical significance of the spreads of sovereign bonds or country risk in the seven largest emerging markets for which data is available, Argentina, Brazil, Russia, Mexico, Turkey, South Africa and Venezuela, for the time period between January 2001, and October 2012.

Computation of the cost of equity lies at the center of financial theory and practice. Academics and practitioners have suggested several different models to tackle the cost of equity in international markets. The starting point to divide the different asset pricing models is whether the international stock markets are considered as segmented, fully integrated or partially integrated markets.

As pointed out by Bekaert and Harvey (1995) the local CAPM appears when the CAPM of Sharpe (1964), Lintner (1965) and Black(1972) is tested on the data of returns from a single national stock market index. This is the case for all the seminal tests in the US stock market, such as the works of Fama and MacBeth (1973), Lintner(1965) or Black(1972).

The international CAPM, also called global CAPM or world CAPM, is first defined in the works of Dumas and Solnik (1995), and Dumas (1994). This model

[1]In this paper we use the terms "country risk" as synonym of "country spread", with the meaning of the yield spread of sovereign bonds from that country with respect to bonds of similar maturity issued by the US Treasury. Although this is the usual definition of country risk, some researchers, have used different definitions; see Damodaran (2003) for a broad discussion on this issue. Other related model use the credit rating measure (rather than country spreads) in the computation of equity returns, for instance, Erb, Harvey and Vishkanta (1996).

applies when stock markets are fully integrated across different countries, and utilizes as market benchmark the returns on a world stock market index, such as the global MSCI. [2]

The CAPM, under the assumption of partially integrated markets, is first studied by Errunza, Vihang and Losq, (1985). Beakert and Harvey (1995) study a partially integrated CAPM with time variation in the degree of world capital markets integration. Bodnar, Dumas and Marston (2003) present the partially integrated CAPM as a two factor model in which stock returns depend both on their domestic market index returns, and also on the returns of a world market index.

Several researchers use modified versions of the models mentioned above to compute expected equity returns in emerging markets: Mariscal and Lee (1993) introduce the country risk variable (also often called country spread), i.e. the difference between the yields to maturity of the emerging market sovereign bonds (denominated in US dollars) and the yield to maturity of US Treasury bonds. This country spread variable is added to a modified version of the international CAPM so as to provide the cost of equity in developing world stocks.

Mariscal and Lee's model has become very popular among practitioners. Their proposal of adding the country spread variable to measure the equity return for emerging markets has influenced other equity models that are popular among financial practitioners such as the ones introduced by Damodaran (2002) and Godfrey and Espinosa (1996). In particular Damodaran (2002) proposes a model of equity valuation in emerging markets, which he calls "The Lambda Approach" in which the coefficient lambda of the country risk variable does not need to be equal to one. Our work tests Damodaran Lambda Approach model, among several others, to verify the empirical validity of this model and particularly, its implicit assumption of significance of the country spread variable.

[2]Koedijk, Kool, Schotman and Van Dijk (2002) analyze to what extent the multifactor international CAPM and the domestic CAPM lead to different estimates of the cost of capital for individual firms.

Mariscal and Lee (1993) suggest summing up the country spread variable, as a way to obtain expected equity returns which are more accurate than the ones that resulted from a direct application of the global CAPM to emerging markets. As Harvey (1995 a & 1995 b) has shown, the correlation between equity returns in emerging markets *vis à vis* the returns of mature markets is low. Hence, a straightforward application of the global CAPM using an international benchmark that is strongly based on developed market indices would provide expected equity returns for emerging markets that are well below those actually observed (Harvey, 2001). By adding the country risk premium, Mariscal and Lee (1993) and others who follow suit aim to obtain expected equity returns with values that are closer to what is intuitively expected by financial practitioners.

It has long been known that the country spread variable has enormous relevance in the emerging financial markets. It measures the cost of sovereign debt financing for each country, and it also shows strong correlation with the yields of corporate debt issued by companies domiciled in this markets (Durbin and Ng, 2005).

Although the addition of country spread in emerging markets equity valuation is intuitively appealing, it also has some shortcomings. On the one hand, this direct addition of country risk does not arise from any well founded asset pricing theoretical model, such as the CAPM, the APT or the global CAPM. Also, the variable being added is a measure of the risk of default of sovereign bonds, while it is being used in emerging markets valuation as a component of the expected equity return. Nevertheless, there are neither theoretical nor empirical evidence showing that the cost of equity of each company follows a on-to-one relationship with the sovereign borrowing cost. Moreover, the significance of the country spread variable as a risk factor to explain returns of emerging market firms has not been empirically tested.

Even if the country spread variable turns out to be a significant risk factor

to explain emerging market equity returns, it has never been proven that this variable has to be used with a factor loading of one for all assets (rather than any other coefficient) as is the standard practice in emerging markets' equity valuation. In terms of multifactor models, the factor loading of the country risk variable should be allowed to change from one asset to the other, depending on the sensitivity of each asset's return to the country spread factor.

In the standard CAPM the risk free rate is added as part of the equity return equation. Nevertheless, the addition of the country risk variable in emerging market equity returns is a totally different issue, since the country spread variable is not a zero-beta riskless variable.

One of the primary objectives of this paper is to find out whether the country risk variable is priced as a risk factor in multifactor asset pricing models of the cost of equity in emerging markets. We start by considering the variants of those models frequently used in emerging markets, and the empirical evidence that supports them. These three models are the local CAPM and the global CAPM, as well as the extended multifactor model that combines both global and local betas. The global CAPM is studied with the addition of foreign exchange risk, as suggested by Dumas and Solnik (1995) and also Jorion and Schwartz (1986). We study the significance of the country spread variable coefficient in the three models based on CAPM for the sake of completeness.

Although the country spread is usually defined as a risk measure[3], it has typically been used as a rate rather than a risk factor in the models of equity valuation, for instance in Damodaran (2002) or in Mariscal and Lee (1993), and also in Godfrey and Espinosa (1996).[4] Meaning that in these models, the

[3]The country spread is considered to reflect the market view on the likelihood of default by the sovereign debtor.

[4]In a related work, Erb, Harvey and Viskanta (1996) have studied whether countries credit ratings have significant power to explain the returns of forty seven equity market indices. Although their concern is related to ours, they do not attempt to compute the returns of individual stocks or projects, and also, their explanatory variable are country credit ratings, rather than country spreads. Abuaf (2011) applies a multifactor model of equity valuation to the ADR of several large emerging markets, and he includes the country risk measure based on the CDS rates. Nevertheless, he uses fixed coefficients regressions rather than rolling betas. Besides, he does not test for the significance of the risk premium coefficients, nor does he test

country spread is summed up, with the implicit assumption of a beta coefficient with value one, if the country risk were used as a risk factor.

In this paper we take a multifactor approach, in which the country spread is considered as a risk factor. Under this assumption, two questions arise. Is this factor really priced by the market (i.e. its risk premium is statistically different than zero)? Also, is the factor loading related to the country risk spread equal to one for all or at least the vast majority of the equity returns in emerging markets?

We provide evidence from the following emerging markets: Argentina, Brazil, Russia, Mexico, Turkey, South Africa and Venezuela from 2001 to 2012. We selected those emerging markets that fulfill two conditions: That they belong to the group of the thirty largest economies of the world, at nominal values, by 2012 and also that these countries have data on their country risk as measured by the EMBI index[5], which has been the measure of country risk most frequently used by financial practitioners in emerging markets during the period under consideration.

In section 2 we present the three different valuation models considered in this work, in section 3 we describe the data used and the estimation methodology, section 4 shows our main results and section 5 concludes.

2 Models

We will consider the explanatory power of the different risk factors and particularly the explanatory power of the country spread variable for the following multifactor models in each of the emerging markets that constitute our sample.

whether the factor loadings for the country risk factor should be one.

[5]Emerging Market Bond Index, regularly published by the investment firm J.P. Morgan.

2.1 The Extended International CAPM

The international CAPM, also called world CAPM or global CAPM that stems from the works of Sercu (1980), Dumas (1994) ad Dumas and Solnik(1995) is based on a market portfolio given by a world equity index, and the market betas of individual stocks are computed *vis à vis* this world equity index.

We will test the relevance of the country spread variable as an independent risk factor. Hence, we study the following model, which we call extendend international CAPM:

$$E(R_{i,x}) = R_f + \beta_i[E(R_M) - R_f] + \lambda_{i,x}E(s_x) + \beta_{2i}CR_x. \quad (1)$$

In which

- R_f is the international risk free rate (Federal Reserve T-Bill rates).
- $E(R_M)$ is the expected value of the international market index return (MSCI in the main specification).
- β_i is the coefficient related to R_M.
- s_x is the monthly variation of the spot exchange rate between the dollar and the local currency.
- CR is the country risk variable (EMBI +).
- And $R_{i,x}$ is the return on a stock i of country x.

2.2 The Extended Multifactor Model

Following Bodnar, Dumas and Marston (2003) we consider a multifactor model including the returns on a world market portfolio and the domestic (country) market portfolio as explanatory variables. Also the exchange risk factor is included. To test the relevance of the country spread variable as an independent risk factor to explain individual stock returns in this model we study the fol-

lowing specification, which we call extended multifactor model:

$$E(R_{i,x}) = R_f + \beta_i[E(R_M) - R_f] + \beta_{i,x}[E(R_x) - R_{f,x}] + \lambda_{i,x}E(s_x) + \beta_{2i}CR_x. \quad (2)$$

The notation is analogous to that of the extended international CAPM, but here we add the local market index risk premium as a risk factor. As in the first model we use the MSCI as a proxy for the international market index (see Apendix for a specification with S&P 500 instead of MSCI as proxy).

2.3 The Extended Local CAPM

Starting with the works of Sharpe (1964), Lintner (1965) and Black(1972) this is the more common specification in empirical tests of CAPM, and is also often used in emerging markets. In this specification, which we call extended local CAPM, the market portfolio is given by the domestic equity index. As in the previous models, we add the country spread as a new risk factor:

$$E(R_{i,x}) = R_f + \beta_{i,x}[E(R_x) - R_{f,x}] + \beta_{2i}CR_x. \quad (3)$$

3 Data and Methodology

The countries chosen in this study are those included in the Emerging Markets Bond Index Plus (EMBI +, published by JP Morgan) that are also part of the group of 30 largest economies[6] in terms of nominal GDP in 2012. These countries are: Brazil, Russia, Mexico, Turkey, Argentina, South Africa and Venezuela. For each country we select those stocks traded in its major Stock Exchange Market that compose one of its indeces[7] as of October 31, 2012. We use Bloomberg's total return index for each stock to calculate its monthly returns from the last trading day of one month to the last trading day of the following

[6]Indonesia is excluded because of infrequent trading. Poland is excluded because it was excluded from the EMBI + in 2007.

[7]See the Appendix for the complete list of Stock Indeces and Stocks used.

month. For the first two models we convert these indeces that are originally denominated in local currency to dollars (using the spot exchange rate between dollars and the country's local currency). To proxy the international market portfolio we use the Morgan Stanley Capital International Inc. World Index (MSCI)[8] We obtained it's daily price quotes from Bloomberg and calculated monthly returns from the last trading day of one month to the last trading day of the following month. The monthly variations of each dollar to local currency exchange rate are calculated the same way and the spot exchange rate daily quotes were obtained from Bloomberg as well.

We use each country's EMBI+ spread as a measure of country risk, following the most common practice among financial practitioners.[9] This index is computed as the difference between a portfolio of dollar denominated sovereign bonds issued by each country's government and the US Treasury Bill rate[10].

The monthly returns of local indeces are obtained from the local indeces' prices listed on Bloomberg. We use the same indeces from which we selected the stocks for each country.

As we already mentioned the whole study will use time series of returns with monthly frequency, starting in January 2001 (because of the EMBI+ availability) and ending in October 2012.

For each model and for each stock in each country we calculate a time series of rolling betas using the last 36 months. These rolling betas are calculated with monthly frequency: For instance, in February 2004 we compute betas using data from January 2001 to January 2004 (36 months). In each model the betas are estimated using a multivariate OLS approach.

We follow Fama and Macbeth (1973) two pass procedure to calculate each

[8]We also test each model using the Standard and Poor's 500 (S&P 500) as a proxy in a second specification, with very similar results, presented in Tables A2 and A3 in the Appendix.

[9]In the last few years, CDS rates have also become usual as a measure of country risk. Nevertheless, the EMBI continues to be a broadly used measure of country risk. Moreover if we had used CDS rates rather than the EMBI, the sample period would have been much shorter, resulting in less powerful tests.

[10]For more information on the composition of the EMBI+ refer to JP Morgan (1999).

factor's risk premium. We estimate rolling betas for each asset in each market and for each model (equations 1, 2 and 3) using three years (36 months) of monthly time series of returns and each factor's values during that time. We estimate each model's factor loadings for each month by using data of the last 36 months, not including the current month. This means that the factor loadings corresponding to January 2006 are computed using data from January 2003 to December 2005 inclusive.

Using the time series of betas for each asset we calculate a cross section regression of the month t realized returns for each asset onto each assets factor loadings computed using data until month t (without including month t). For the first model the relationship estimated can be depicted as

$$E(R_{i,t}) = \gamma_{0,t} + \gamma_{1,t}\beta_{m,t} + \gamma_{2,t}\beta_{CR,t} + \gamma_{3,t}\beta_{EXR,t} + \mu_t \tag{4}$$

In the previous equation, the expected monthly returns on each asset are proxied by the realized returns, and the estimated factor loadings in the first pass regressions are used in the cross sectional regressions and μ_t is an idiosyncratic error term. The gamma coefficients obtained for each of this monthly cross sectional regressions are the risk premium associated with each factor.

Most of the empirical studies that use the Fama Macbeth Two Pass Methodology to compute factor risk premiums create portfolios in order to reduce the idiosyncratic volatility by diversification, which in turn implies a more precise estimate of the factor loadings (i.e. a less volatile estimate). Fama and Macbeth (1973) and Fama and French (1996) among others argue that this more precise factor loadings lead to more precise factor risk premia estimates (i.e. with lower asymptotic variance). Ang, Liu and Schwarz (2011) show that instead, creating portfolios shrinks the dispersion of betas and leads to higher asymptotic variance of risk premia estimates. In this paper we choose to estimate factor loadings by using individual stocks, because many emerging markets have very few densely

traded stocks[11], and grouping them into portfolios would not only shrink the dispersion of betas, it would also not improve substantially the precision of the factor loading estimates, because each portfolio would be composed of only a few stocks. Another reason why we use individual stocks instead of creating portfolios is because almost all of the most common models for computing the cost of equity in emerging markets are used in practice with individual stocks, and not with portfolios. If we had used portfolios instead of individual stocks we would not be testing the same family of models used by practitioners.

We implement two different tests using the estimated factor loadings and risk premium for each model and for each market. Using the time series of rolling betas for each asset in each model we test if the mean of the country risk's betas for each asset is significantly different than one[12]. Using the estimated risk premium for each factor in each model and market we test whether each risk premium is significantly different than zero or not.

4 Results

Country	Total num. of stocks	Number of stocks with $\beta_{CR} \neq 1$ (10%)		
		Model 1	Model 2	Model 3
Argentina	12	9	11	7
Brazil	68	46	36	45
Mexico	35	22	25	20
Russia	30	18	11	21
Turkey	30	24	20	17
South Africa	42	16	21	15
Venezuela	14	7	7	5

Table 1: Number of stocks by country with $\beta_{CR} \neq 1$ at a 10% confidence level, for each model, with MSCI as International Market Index. Model 1 corresponds to the extended international CAPM, Model 2 to the extended multifactor model, and model 3 to the extended local CAPM.

[11] In Argentina, for example, there are only 14 stocks with enough liquidity to be included in the Stock Market Index.

[12] We use Newey West standard errors (Newey and West, 1987) for the t-test to compensate for the autocorrelation in the error terms of the second pass regressions induced by the autocorrelation in the estimated factor loadings.

Table 1 shows the results of a t-test on the mean of the country risk betas to verify whether it is different from one for each stock in each country using the three different specifications, with the MSCI as the international stock benchmark. We observe that for the extended international CAPM the average value of betas is significantly different from one in 142 out of 231 stocks. Also, the mean is different from one in at least 50% of the cases for all countries except South Africa. Similarly, for the extended multifactor model in table 1, we observe that the mean of the betas is significantly different from one in at least 50% of the cases for all countries in the sample. For the extended local CAPM model, in table 1 we find that the mean of the betas is significantly different from one in 132 out of 231 stocks. Also this mean is significantly different from one in more than 50% of the stocks of five of the seven countries in the sample: Argentina, Brazil, Russia, Mexico and Turkey. Similar results were obtained when using the S&P 500 as the proxy for the international stock market index (see Appendix, table A1).

As we can see in Table 1, there seems to be no empirical support for the usual practice of assuming a priori that the country risk variable should be added with a coefficient value of one, and this applies in the extended international CAPM, as well as in the extended multifactor CAPM, and also on the extended local CAPM.

4.1 Extended International CAPM and Country Spread

We continue by testing if each factor's risk premium is statistically different than zero with a t-test on the mean of each factor's estimated risk premium, using the time series generated by the monthly cross sectional regressions.

Table 2 shows that, for the multifactor model with international CAPM and country spread risk factors, (extended international CAPM, with MSCI as the international stocks return benchmark) the risk premium of the country spread factor EMBI is statistically different from zero, only for two countries in the

	Argentina	Brazil	Mexico	Russia	Turkey	S. Africa	Venezuela
MSCI	-0.00086	-0.00092	0.00431	-0.0027	0.00048	0.0046	0.00414
	(0.004327)	(0.006678)	(0.005024)	(0.004469)	(0.003600)	(0.003740)	(0.008240)
EMBI	-0.00048	-.00027**	-.00012**	-0.00008	0.00003	-0.00003	0.00044
	(0.001330)	(0.000136)	(0.000065)	(0.000101)	(0.000069)	(0.000048)	(0.000384)
XRT	-0.01421	0.00144	0.0011	0.0007	-0.0019	0.0021	0.00630
	(0.010804)	(0.00342)	(0.002418)	(0.002545)	(0.003655)	(0.00520)	(0.01157)

Table 2: Gammas for each beta of each factor in Model 1, by country. Newey-West Standard Errors in parentheses, with 5 months lags. $*p < 0.1$; $**p < 0.05$; $***p < 0.01$; $\hat{}p < 0.1$ with Standard deviations calculated with a 3 months lag; and $'p < 0.1$ with Standard deviations calculated with a 1 month lag.

sample: Brazil and Mexico, and it is significant at the five per cent level in both cases. In the other five countries of the sample, this risk premium can't be considered significant. Similar qualitative results are achieved by using the S&P 500 instead of the MSCI as the international stock return benchmark (see Appendix, table A2).

4.2 The Extended Multifactor Model

	Argentina	Brazil	Mexico	Russia	Turkey	S. Africa	Venezuela
MSCI	0.00762*	-0.00257	0.00572	-0.0072	0.00317	.00765*	0.01215
	(0.00407)	(0.00584)	(0.00520)	(0.00473)	(0.0038)	(0.00427)	(0.00916)
Loc. Index	-0.00059	-0.00661	-0.00060	-0.00730	0.00962'	.01107^	0.00599
	(0.0117)	(0.0050)	(0.0060)	(0.00863)	(0.00609)	(0.00671)	(0.01676)
EMBI	-0.000068	-.00031***	-.000096^	-0.000049	0.00006	0.0000	0.00020
	(0.00097)	(0.00014)	(0.00006)	(0.00015)	(0.000079)	(0.000049)	(0.00045)
exchrate	-0.00578	-0.00070	0.00355	-0.00078	0.0023	0.00436	0.01748
	(0.0120)	(0.0040)	(0.00252)	(0.00248)	(0.00403)	(0.00517)	(0.01192)

Table 3: Gammas for each beta of each factor in Model 2, by country.Newey-West Standard Errors in parentheses, with 5 months lags. $*p < 0.1$; $**p < 0.05$; $***p < 0.01$; $\hat{}p < 0.1$ with Standard deviations calculated with a 3 months lag; and $'p < 0.1$ with Standard deviations calculated with a 1 month lag.

Table 3 shows that, for the extended multifactor model, with MSCI as the international stocks return benchmark, the risk premium of the country spread factor EMBI is statistically different from zero, only for two countries in the sample: Brazil and Mexico. In Brazil this risk premium is significant at the one percent level, while in Mexico it is significant at the ten percent level. In

the other five countries of the sample, this risk premium can't be considered significant.

In the Appendix we show similar estimation using the S&P 500 instead of the MSCI (table A3). The results are similar, only for Brazil and Mexico is the country risk factor's risk premium significantly different than zero, and in the case of Mexico the coefficient is significant even with a 5 month lag in the Newey-West standard errors.

4.3 The local CAPM and Country Risk Model

	Argentina	Brazil	Mexico	Russia	Turkey	South Africa	Venezuela
Local Index	0.0001	-0.0044	0.0011	-0.0073	0.00006	0.0048	-0.0022
	(0.00902)	(0.00753)	(0.0049)	(0.0073)	(0.0063)	(0.0054)	(0.0044)
EMBI	0.00019	-0.000034	-.000119*	-0.00007	-0.000018	-0.00008	0.00001
	(0.00016)	(0.00006)	(0.00007)	(0.00009)	(0.00006)	(0.00005)	(0.0003)

Table 4: Gammas for each beta of each factor in Model 3, by country. Newey-West Standard Errors in parentheses, with 5 months lags. $*p < 0.1$; $**p < 0.05$; $***p < 0.01$; $\hat{}\, p < 0.1$ with Standard deviations calculated with a 3 months lag; and $'p < 0.1$ with Standard deviations calculated with a 1 month lag.

Table 4 shows that, for the multifactor model with local CAPM and country spread risk factors (extended local CAPM) the risk premium of the country spread factor EMBI is statistically different from zero, only for one country in the sample: Mexico, in which it is significant at the one percent level. In the other six countries of the sample, this risk premium can't be considered significant.

4.4 Country Risk Coefficients

We will next show the values and signs of the coefficient for the country risk variable under the three different models that we study:

In table 5 we observe a negative sign for the risk premia of the country risk factor in Brazil, Mexico, Russia, South Africa and Argentina (although these coefficients are only significantly different than zero for Mexico and Brazil).

	Argentina	Brazil	Mexico	Russia	Turkey	South Africa	Venezuela
M 1	-0.0004766	-.0002701**	-.000119**	-0.0000809	0.0000254	-0.0000252	0.0004372
	(0.0013297)	(0.0001358)	(0.0000645)	(0.0001014)	(0.0000692)	(0.0000477)	(0.0003844)
M 2	-0.0000679	-.0003096***	-.0000955ˆ	-0.0000489	0.0000624	0.00000466	0.0002041
	(0.0009692)	(0.0001443)	(0.000058)	(0.0001456)	(0.0000792)	(0.0000493)	(0.0004463)
M 3	0.0001876	-0.0000339	-.0001187*	-0.000065	-0.0000175	-0.0000829	0.000013
	(0.0001571)	(0.0000552)	(0.0000653)	(0.0000922)	(0.0000562)	(0.0000537)	(0.000256)

Table 5: Estimated risk premium for the country risk factor for each model, by country. Newey-West Standard Errors in parentheses, with 5 months lags. $*p < 0.1$; $**p < 0.05$; $***p < 0.01$;ˆ$p < 0.1$ with Standard deviations calculated with a 3 months lag; and ' $p < 0.1$ with Standard deviations calculated with a 1 month lag.

Since the country risk spread directly measures the extra yield requested of the local sovereign bonds over their US counterparts, one interpretation of these negative risk premia is that stocks whose returns have little or even negative correlation with the country risk factor will be valuablefalt as a hedge against assets more related to the country risk -fixed income instruments, for example- and therefore exhibit higher expected returns.

5 Conclusions

Brazil and Mexico are the only two markets in which the country risk factor's risk premia is significant, both in the model where the MSCI is used, and in the one in which the S&P 500 is used as a proxy for the global equity market. Similarly the country spread risk premia is significant in the extended multifactor model at the five per cent level only for these two countries, and Mexico is the only country for which the country risk premia is significantly different from zero in the extended international CAPM model. Nevertheless, the addition of country risk to compute equity returns can not be taken for granted neither in Brazil nor in Mexico: in both markets there is a large proportion of stocks whose β_{EMBI} is significantly different from one (46 out of 82 stocks in Brazil and 22 out of 47 in Mexico).

In summary, our research provides empirical support for the use of the coun-

try risk variable as an independent risk factor only in the Brazilian and Mexican stock markets, for the 2001-2012 period, while it fails to accept that use in Russia, Argentina, Turkey, South Africa and Venezuela. Moreover, even for Brazil and Mexico there is no evidence supporting the unconditional addition of country risk with a coefficient of one to compute expected returns: on the contrary, the relevant valuation model should be run for each asset, in order to obtain the appropriate factor loading for the country risk factor, and this factor loading may end up being rather different than one.

It is also relevant that in the two markets in which the country risk factor's risk premium is significant, Brazil and Mexico, these coefficients take negative values. This means that assets with larger sensitivity to the country risk factor have smaller expected returns on average. Negative risk premia for country risk is also present in Russia, South Africa and Argentina, although at non-significant coefficient values. Since country risk is a direct measure of the extra yield that investors require of local sovereign bonds over the US Treasuries, these negative risk premia mean that investors are willing to accept smaller expected returns for assets with larger exposure to country risk. Our interpretation of this phenomenon is that international investors often prefer the assets with large exposure to country risk as a vehicle to diversify their large exposure to developed stock markets, as measured by the world market index (MSCI or S&P 500). In this regard, we highlight that for Brazil this negative gamma is present in the extended international CAPM and extended multifactor model, while it is absent in the extended local model. Also, for Mexico, the risk premium is negative and larger in absolute value in the extended international CAPM model than in the other two models. Both the Brazilian and the Mexican are two of the markets most often chosen by international investors. Further research should be conducted to explore whether this negative risk premia effect *vis à vis* sovereign spreads is also present in other international stock markets.

We have identified several serious difficulties with the usual approach of

summing up the country risk variable in the different versions of CAPM models for equity valuation in emerging markets. Therefore, a well specified multifactor CAPM-based valuation technique requires the use of a case by case approach, in which the model is analyzed in each domestic market, in order to establish the significance of the country risk variable coefficient in that market. After establishing which variables are relevant, the multifactor model should be run for each stock, to obtain the particular coefficients which apply to each variable in that specific stock, rather than assuming that the same coefficient (i.e. one) applies to all different stocks.

Alternatively more empirical work should be conducted, on alternative equity valuation models in emerging markets which do not rely on the country spread variable, such as the models proposed by Erb, Harvey and Viskanta (1996), Lessard(1996) or Estrada (2001).

References

[1] Niso Abuaf. Valuing emerging market equities: The empirical evidence. *Journal of Applied Finance*, 21(2):123, 2011.

[2] Sandro C Andrade. A model of asset pricing under country risk. *Journal of International Money and Finance*, 28(4):671–695, 2009.

[3] Geert Bekaert and Campbell R Harvey. Time-varying world market integration. *The Journal of Finance*, 50(2):403–444, 1995.

[4] Geert Bekaert and Campbell R Harvey. Research in emerging markets finance: Looking to the future. *Emerging Markets Review*, 3(4):429–448, 2002.

[5] Fischer Black. Capital market equilibrium with restricted borrowing. *Journal of business*, pages 444–455, 1972.

[6] Gordon M Bodnar, Bernard Dumas, and Richard D Marston. Cross-border valuation: The international cost of equity capital. Technical report, National Bureau of Economic Research, 2003.

[7] Aswath Damodaran. Country risk and company exposure: Theory and practice. *Journal of applied finance*, 13(2):63–76, 2003.

[8] Bernard Dumas and Bruno Solnik. The world price of foreign exchange risk. *The journal of finance*, 50(2):445–479, 1995.

[9] Erik Durbin and David Ng. The sovereign ceiling and emerging market corporate bond spreads. *Journal of International Money and Finance*, 24(4):631–649, 2005.

[10] Claude B Erb, Campbell R Harvey, and Tadas E Viskanta. Country risk and global equity selection. *The Journal of Portfolio Management*, 21(2):74–83, 1995.

[11] Claude B Erb, Campbell R Harvey, and Tadas E Viskanta. Expected returns and volatility in 135 countries. *The Journal of Portfolio Management*, 22(3):46–58, 1996.

[12] Vihang Errunza and Etienne Losq. International asset pricing under mild segmentation: Theory and test. *The Journal of Finance*, 40(1):105–124, 1985.

[13] Javier Estrada. The cost of equity in emerging markets: a downside risk approach. *Emerging Markets Quarterly*, 4:19–31, 2000.

[14] Javier Estrada. Discount rates in emerging markets: Four models and an application. *Journal of Applied Corporate Finance*, 19(2):72–77, 2007.

[15] Eugene F Fama and Kenneth R French. Multifactor explanations of asset pricing anomalies. *The journal of finance*, 51(1):55–84, 1996.

[16] Eugene F Fama and James D MacBeth. Risk, return, and equilibrium: Empirical tests. *The Journal of Political Economy*, pages 607–636, 1973.

[17] Darcy Fuenzalida and Samuel Mongrut. Estimation of discount rates in latin america: Empirical evidence and challenges. *Journal of Economics, Finance & Administrative Science*, 15(28), 2010.

[18] Stephen Godfrey and Ramon Espinosa. A practical approach to calculating costs of equity for investments in emerging markets. *Journal of Applied Corporate Finance*, 9(3):80–90, 1996.

[19] Campbell R Harvey. Predictable risk and returns in emerging markets. *Review of Financial studies*, 8(3):773–816, 1995.

[20] Campbell R Harvey. The risk exposure of emerging equity markets. *The World Bank Economic Review*, 9(1):19–50, 1995.

[21] Campbell R Harvey. The international cost of capital and risk calculator (iccrc). *Duke University*, 2001.

[22] Philippe Jorion and Eduardo Schwartz. Integration vs. segmentation in the canadian stock market. *The Journal of Finance*, 41(3):603–614, 1986.

[23] Kees G Koedijk, Clemens JM Kool, Peter C Schotman, and Mathijs A Van Dijk. The cost of capital in international financial markets: Local or global? *Journal of International Money and Finance*, 21(6):905–929, 2002.

[24] Donald R Lessard. Incorporating country risk in the valuation of offshore projects. *Journal of Applied Corporate Finance*, 9(3):52–63, 1996.

[25] John Lintner. The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *The Review of Economics and Statistics*, pages 13–37, 1965.

[26] Jorge O Mariscal and Rafaelina M Lee. The valuation of mexican stocks: An extension of the capital asset pricing model. *Goldman Sachs, New York*, 1993.

[27] JP Morgan. Introducing the jp morgan emerging markets bond index global (embi global). *Methodology Brief, JP Morgan, New York*, 1999.

[28] Piet Sercu. A generalization of the international asset pricing model. *Revue de l'Association Française de Finance*, 1(1):91–135, 1980.

[29] William F Sharpe. Capital asset prices: A theory of market equilibrium under conditions of risk. *The Journal of Finance*, 19(3):425–442, 1964.

A Specifications with S&P as International Market Index

Country	Total num. of stocks	Number of stocks with $\beta_{CR} \neq 1$ (10%)	
		Model 1	Model 2
Argentina	12	8	10
Brazil	68	44	45
Mexico	35	23	23
Russia	30	19	18
Turkey	30	22	18
South Africa	42	9	13
Venezuela	14	9	7

Table A1: Number of stocks by country with $\beta_{CR} \neq 1$ at a 10% confidence level, for each model, with S&P as International Market Index. Model 1 corresponds to the extended international CAPM, Model 2 to the extended multifactor model, and model 3 to the extended local CAPM.

	Argentina	Brazil	Mexico	Russia	Turkey	South Africa	Venezuela
S&P	-0.00473	0.00269	-0.00453	0.00074	-0.00349	-0.00683*	0.00306
	(0.00459)	(0.00382)	(0.00386)	(0.00451)	(0.00366)	(0.00386)	(0.00858)
EMBI	-0.00045	-0.00036**	-0.00013*	-0.00004	0.00001	-0.00005	0.00022
	(0.00124)	(0.00016)	(0.00006)	(0.00011)	(0.00007)	(0.00005)	(0.00041)
exchrate	-0.01631	0.00142	0.00129	0.00147	-0.00406	-0.00013	0.00997
	(0.01108)	(0.00376)	(0.00240)	(0.00284)	(0.00382)	(0.00550)	(0.01194)

Table A2: Gammas for each beta of each factor in the extended international CAPM by country, but with S&P instead of MSCI. Newey-West Standard Errors in parentheses, with 5 months lags. $*p < 0.1$; $**p < 0.05$; $***p < 0.01$;$\hat{}\, p < 0.1$ with Standard deviations calculated with a 3 months lag; and $'p < 0.1$ with Standard deviations calculated with a 1 month lag.

	Argentina	Brazil	Mexico	Russia	Turkey	South Africa	Venezuela
S&P	-0.01719***	0.00040	-0.00563	-0.00014	-0.00416	-0.00821**	0.0037
	(0.00539)	(0.00350)	(0.0044)	(0.00521)	(0.00394)	(0.00380)	(0.00914)
Local Index	-0.00571	-0.00576	0.0019	-0.00777	0.00870	0.00644	-0.00297
	(0.00992)	(0.00410)	(0.00580)	(0.00904)	(0.0062472)	(0.00746)	(0.01457)
EMBI	0.00016	-0.00041**	-0.00014**	0.00004	0.00006	-0.00004	0.00022
	(0.00106)	(0.00017)	(0.00006)	(0.00014)	(0.00008)	(0.00004)	(0.00048)
exchrate	-0.01605	-0.0007	0.00312	-0.00035	-0.00003	0.0007	0.01335
	(0.01089)	(0.00418)	(0.00249)	(0.00266)	(0.00414)	(0.00532)	(0.01175)

Table A3: Gammas for each beta of each factor in the extended multifactor model, by country, but with S&P instead of MSCI. Newey-West Standard Errors in parentheses, with 5 months lags. $*p < 0.1$; $**p < 0.05$; $***p < 0.01$; $\hat{}p < 0.1$ with Standard deviations calculated with a 3 months lag; and $'p < 0.1$ with Standard deviations calculated with a 1 month lag.

B Data Appendix

In this section we list all the stocks used in the study. These are the stocks that composed the following stock indices as of October 31, 2012:

- Ibovespa Brasil Sao Paulo Stock Exchange Index (BOVESPA)
- Mexican Stock Exchange Mexican Bolsa IPC Index (MEXBOL)
- Moscow Interbank Currency Exchange Index (MICEX)
- Borsa Istanbul 30 (BIS 30)
- Caracas Stock Exchange Stock Market Index (IBVC)
- Buenos Aires Stock Exchange Merval Index (MERVAL)
- FTSE/JSE Africa Top40 Tradeable Index (TOP 40)

Table A4: Name and Bloomberg Tickers for all Brazilian stocks used in this study.

Brazil Stocks	
ALLL3:ALL America Latina Logistica SA	GGBR4:Gerdau SA
BTOW3:B2W Cia Digital	GOLL4:Gol Linhas Aereas Inteligentes SA
BBDC4:Banco Bradesco SA	HYPE3:Hypermarcas SA
BBAS3:Banco do Brasil SA	ITUB4:Itau Unibanco Holding SA
SANB11:Banco Santander Brasil SA/Brazil	ITSA4:Itausa Investimentos Itau SA
BVMF3:BM&FBovespa SA	JBSS3:JBS SA
BRML3:BR Malls Participacoes SA	KLBN4:Klabin SA
BRAP4:Bradespar SA	LIGT3:Light SA
OIBR3:Oi SA	LLXL3:Prumo Logistica SA
OIBR4:Oi SA	RENT3:Localiza Rent a Car SA
BRKM5:Braskem SA	LAME4:Lojas Americanas SA
BRFS3:BRF SA	LREN3:Lojas Renner SA
BISA3:Brookfield Incorporacoes SA	MRFG3:Marfrig Global Foods SA
CCRO3:CCR SA	GOAU4:Metalurgica Gerdau SA
ELET3:Centrais Eletricas Brasileiras SA	MMXM3:MMX Mineracao e Metalicos SA
ELET6:Centrais Eletricas Brasileiras SA	MRVE3:MRV Engenharia e Participacoes SA
CTIP3:CETIP SA Mercados Organizados	NATU3:Natura Cosmeticos SA
TRPL4:Cia de Transmissao de Energia Eletrica Paulista	OGXP3:Oleo e Gas Participacoes SA
AMBV4:XP Iapp FI Multimercado Fund	PDGR3:PDG Realty SA Empreendimentos e Participacoes
CMIG4:Cia Energetica de Minas Gerais	PETR3:Petroleo Brasileiro SA
CESP6:Cia Energetica de Sao Paulo	PETR4:Petroleo Brasileiro SA
HGTX3:Cia Hering	PCAR4:Cia Brasileira de Distribuicao Grupo Pao de Acucar
CPLE6:Cia Paranaense de Energia	RSID3:Rossi Residencial SA
CSNA3:Cia Siderurgica Nacional SA	SBSP3:Cia de Saneamento Basico do Estado de Sao Paulo
CIEL3:Cielo SA	CRUZ3:Souza Cruz SA
CSAN3:Cosan SA Industria e Comercio	SUZB5:Suzano Papel e Celulose SA
CPFE3:CPFL Energia SA	VIVT4:Telefonica Brasil SA
CYRE3:Cyrela Brazil Realty SA Empreendimentos e Participacoes	TIMP3:Tim Participacoes SA
DASA3:Diagnosticos da America SA	UGPA3:Ultrapar Participacoes SA
DTEX3:Duratex SA	USIM3:Usinas Siderurgicas de Minas Gerais SA
ELPL4:Eletropaulo Metropolitana Eletricidade de Sao Paulo SA	USIM5:Usinas Siderurgicas de Minas Gerais SA
EMBR3:Embraer SA	VALE3:Vale SA
FIBR3:Fibria Celulose SA	VALE5:Vale SA
GFSA3:Gafisa SA	VAGR3:Vanguarda Agro SA

Table A5: Name and Bloomberg Tickers for all Mexican and Russian stocks used in this study.

Mexico Stocks	**Russia Stocks**
ALFAA: Alfa SAB de CV	AFLT: Aeroflot - Russian Airlines OJSC
ALPEKA: Alpek SA de CV	TRNFP: AK Transneft OAO
ALSEA*: Alsea SAB de CV	EONR: E.ON Russia JSC
AMXL: America Movil SAB de CV	HYDR: RusHydro JSC
AC*: Arca Continental SAB de CV	FEES: Federal Grid Co Unified Energy System JSC
BOLSAA: Bolsa Mexicana de Valores SAB de CV	GAZP: Gazprom OAO
CEMEXCPO: Cemex SAB de CV	MRKH: Stock Quote - Russian Grids OAO
KOFL: Coca-Cola Femsa SAB de CV	IRAO: Inter RAO JSC
COMPARC*: Stock Quote - Compartamos SAB de CV	LKOH: Lukoil OAO
GEOB: Corp GEO SAB de CV	MGNT: Magnit OJSC
HOMEX*: Desarrolladora Homex SAB de CV	MAGN: Magnitogorsk Iron & Steel Works
LIVEPOLC: El Puerto de Liverpool SAB de CV	MTLR: Mechel
ICA*: Empresas ICA SAB de CV	GMKN: MMC Norilsk Nickel OJSC
FEMSAUBD: Fomento Economico Mexicano SAB de CV	MTSS: Mobile Telesystems OJSC
LABB: Genomma Lab Internacional SAB de CV	MSNG: Mosenergo OAO
GRUMAB: Gruma SAB de CV	NVTK: NOVATEK OAO
ASURB: Grupo Aeroportuario del Sureste SAB de CV	NLMK: Novolipetsk Steel OJSC
GAPB: Grupo Aeroportuario del Pacifico SAB de CV	RASP: Raspadskaya OAO
BIMBOA: Grupo Bimbo SAB de CV	ROSN: Rosneft OAO
CHDRAUIB: Grupo Comercial Chedraui SA de CV	RTKM: Rostelecom OJSC
ELEKTRA*: Grupo Elektra SAB DE CV	SBER: Sberbank of Russia
GFNORTEO: Grupo Financiero Banorte SAB de CV	SBERP: Sberbank of Russia
GFINBURO: Grupo Financiero Inbursa SAB de CV	CHMF: Severstal OAO
GMODELOC: Grupo Modelo SAB de CV	AFKS: Sistema JSFC
GMEXICOB: Grupo Mexico SAB de CV	SNGS: Surgutneftegas OAO
TLEVICPO: Grupo Televisa SAB	SNGSP: Surgutneftegas
ICHB: Industrias CH SAB de CV	TATN: Tatneft OAO
PE&OLES*: Industrias Penoles SAB de CV	RUALR: United Co RUSAL PLC
KIMBERA: Kimberly-Clark de Mexico SAB de CV	URKA: Uralkali OJSC
MEXCHEM*: Mexichem SAB de CV	VTBR: VTB Bank OJSC
MFRISCOA: Minera Frisco SAB de CV	
OHLMEX*: OHL Mexico SAB de CV	
AZTECACP: TV Azteca SAB de CV	
URBI*: Urbi Desarrollos Urbanos SAB de CV	
WALMEXV: Wal-Mart de Mexico SAB de CV	

Table A6: Name and Bloomberg Tickers for all Turkish and South African stocks used in this study.

Turkey Stocks	**South Africa Stocks**
AKBNK: Akbank TAS	ARI: African Rainbow Minerals Ltd
ARCLK: Arcelik AS	AMS: Anglo American Platinum Ltd
ASYAB: Asya Katilim Bankasi AS	AGL: Anglo American PLC
BIMAS: BIM Birlesik Magazalar AS	ANG: AngloGold Ashanti Ltd
DOHOL: Dogan Sirketler Grubu Holding AS	APN: Aspen Pharmacare Holdings Ltd
EKGYO: Emlak Konut Gayrimenkul Yatirim Ortakligi AS	ASR: Assore Ltd
ENKAI: Enka Insaat ve Sanayi AS	BGA: Barclays Africa Group Ltd
EREGL: Eregli Demir ve Celik Fabrikalari TAS	BIL: BHP Billiton PLC
SAHOL: Haci Omer Sabanci Holding AS	BVT: Bidvest Group Ltd
IHLAS: Ihlas Holding AS	BTI: British American Tobacco PLC
IPEKE: Ipek Dogal Enerji Kaynaklari Ve Uretim AS	CFR: Cie Financiere Richemont SA
KRDMD: Kardemir Karabuk Demir Celik Sanayi ve Ticaret AS	DSY: Discovery Ltd
KCHOL: KOC Holding AS	EXX: Exxaro Resources Ltd
KOZAL: Koza Altin Isletmeleri AS	FSR: FirstRand Ltd
KOZAA: Koza Anadolu Metal Madencilik Isletmeleri AS	GFI: Gold Fields Ltd
MGROS: Migros Ticaret AS	GRT: Growthpoint Properties Ltd
NETAS: Netas Telekomunikasyon AS	IMP: Impala Platinum Holdings Ltd
PETKM: Petkim Petrokimya Holding AS	IPL: Imperial Holdings Ltd
TOASO: Tofas Turk Otomobil Fabrikasi AS	ITU: Intu Properties PLC
TUPRS: Tupras Turkiye Petrol Rafinerileri AS	INL: Investec Ltd
THYAO: Turk Hava Yollari	INP: Investec PLC
TTKOM: Turk Telekomunikasyon AS	KIO: Kumba Iron Ore Ltd
TTRAK: Turk Traktor ve Ziraat Makineleri AS	MSM: Massmart Holdings Ltd
TCELL: Turkcell Iletisim Hizmetleri AS	MDC: Mediclinic International Ltd
GARAN: Turkiye Garanti Bankasi AS	MND: Mondi Ltd
HALKB: Turkiye Halk Bankasi AS	MNP: Mondi PLC
ISCTR: Turkiye Is Bankasi	MTN: MTN Group Ltd
SISE: Turkiye Sise ve Cam Fabrikalari AS	NPN: Naspers Ltd
VAKBN: Turkiye Vakiflar Bankasi Tao	NED: Nedbank Group Ltd
YKBNK: Yapi ve Kredi Bankasi AS	OML: Old Mutual PLC
	REM: Remgro Ltd
	RMH: RMB Holdings Ltd
	SAB: SABMiller PLC
	SLM: Sanlam Ltd
	SOL: Sasol Ltd
	SHP: Shoprite Holdings Ltd
	SBK: Standard Bank Group Ltd
	SHF: Steinhoff International Holdings Ltd
	TBS: Tiger Brands Ltd
	TRU: Truworths International Ltd
	VOD: Vodacom Group Ltd
	WHL: Woolworths Holdings Ltd/South Africa

Table A7: Name and Bloomberg Tickers for all Venezuelian and Argentine stocks used in this study.

Venezuela Stocks	**Argentina Stocks**
BNC : Banco Nacional de Crédito	BMA : Banco Macro
BPV : Banco Provincial	FRAN : BBVA Banco Francés
BBC : Banesco Banco Universal	EDN : Edenor
EDC : Electricidad de Caracas	GGAL : Grupo Financiero Galicia
CRM/A : Grupo Corimon	PAMP : Pampa Energía
DOM : Dominguez y Cia.	PESA : Petrobras Argentina
ENV : Envases Venezuela	APBR : Petroleo Brasileiro – Petrobras
FVI/B : Fondo de Valores Inmobiliarios S.A.C.A.	ERAR : Siderar
HLB : H.L. Boulton	COME : Sociedad Comercial del Plata
MPA : Manpa	TECO2 : Telecom Argentina
MVZ/A : Mercantil Servicios Financieros	TS : Tenaris
MVZ/B : Mercantil Servicios Financieros	YPFD : YPF
SVS : Sivensa	
TDV/D : Cantv	