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Abstract

The CAPM is the most used method in estimating a company's cost of equity. However, several empirical studies show that this model is weak when applied to emerging countries. This paper studies if and how the CAPM explanatory power can be enhanced by adjusting the model for the country risk premium. We tested three different models with three different CRP estimation methodologies: sovereign spread, credit default swap spread and relative volatility. Model 1 assumes that each company has the same exposure to the country risk premium. Model 2 assumes that the country risk premium is a market risk and should be measured by the beta consequently. Model 3 assumes that every company has its own exposure to country risk, which is measured with a separate factor. We found that adjusting the CAPM for the country risk premium improves the CAPM explanatory power in model 2 and 3, with model 3 performing better compared to model 2. Moreover, the CRPs that mostly improve the CAPM are the sovereign spread and the credit default swap spread. A consequence of how the study is designed is that the exposure to the country risk premium varies from company to company, depending on its characteristics and not merely on the country's development. Hence, this exposure should be measured by the beta or by a separate factor, without assuming equal exposure for every company.

1. Introduction

Despite all the developments and modifications that affected history, one thing has not changed since the first industrial revolution: technology has always been a driver of growth. This is even more true in the digitalization era, which has generated a world real-time connected, increasing the world economies' integration. This integration can be divided in two types: Economic integration, meaning that the companies' cash flows around the world have become more interlinked, and Financial integration. Financial integration assumes that, in markets perfectly integrated, the cost of capital that every investor would use is the same across countries and markets. In the field of valuation engagements, the cost of capital is crucial for a correct value estimation. The cost of capital consists of two components: cost of equity and cost of debt. In many cases, problems related to the cost of capital are due to the cost of equity estimation. The most known and used model for this purpose, is the Capital Asset Pricing Model which, despite its lacks, it's the most used model among practitioners, mainly because of its simplicity[1]. However, this model seems to be inefficient when applied to companies that operate in emerging markets. The purpose of this research is to analyze several CRP estimates that have been developed in the past years, testing their efficiency and pitfalls. Hence, the main question the research is trying to address is: Is making a CRP adjustment to the CAPM model, improving[2] the CAPM model?

The research is structured as follows: firstly, we are going to review the recent literature around this topic, in order to understand the theoretical foundations, latest development and how the research can improve the literature up to now. After this chapter, we are going to explain our main assumptions and hypotheses, before testing them through the empirical analysis. Subsequently, the fourth chapter is going to outline our research methodology, together with a detailed description of the regressions that we are going to perform. In the same chapter, we will present how we built the dataset, mainly our sources and selection criteria. The fifth chapter aims to test our hypothesis by implementing the regressions explained in the previous chapter, before concluding the research.

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[1].There is an ongoing debate on whether the APT models outperform the CAPM. However, concrete results in favor or against one of these models have yet to come. See Iqbal T. H., 2011, "Relevance of Capital Asset Pricing Model – A Review". Journal on Banking Financial Services & Insurance Research.

[2].Increasing the model's explanatory power of equities excess returns.

2. Literature Review

2.1 CAPM inefficiencies in emerging markets

The financial literature on this topic is widespread. Most academics agree that the CAPM has several flaws when applied to emerging countries. Firstly, we need to say that for CAPM we mean the Global CAPM,[3] following the theory for which using a domestic benchmark is appropriate only in a closed market. As Harvey (2001) explains, the CAPM has power when applied to developed markets, but the same doesn't apply to emerging economies, where Harvey documented no relation between expected returns and estimated betas measured with respect to the world market portfolio. The main reason for this is that the correlation between emerging markets and the world market portfolio[4] was low at the time of the research. Although the markets' integration has increased in the following years, together with higher correlation[5] (Bekaert and Harvey, 2017), the increase in the beta coefficients is still not enough for explaining the higher returns earned by emerging markets. Another interesting point is to look at how emerging markets reacted during global recessions. Christoffersen *et al.* (2012) analysed the dependence between emerging markets and developed ones. The tail dependence[6] (dependence between observations in the tails of the distribution), between emerging markets and developed ones has increased. However, the lower tail dependence is higher than the upper tail dependence, suggesting that the correlation between markets is much higher in recessions than it is in expansions. This result is consistent with the study of Bekaert *et al.* (2014). The research illustrates that the markets' external exposure played a small role in determining their equity performance during 2008 recession, proving that the dependence between emerging markets and developed ones is higher during crises. These results show that the relationship between these markets is non-linear. The literature provides other evidences about the CAPM inefficiencies in emerging markets.

2.2 Technical and theoretical issues in applying the CAPM to emerging markets

These papers demonstrate how the CAPM can't be applied to the emerging countries as easily as it's applied to the developed ones. Which are the main reasons for this? From the background literature, we can divide them in two parts, technical problems and theoretical ones. Technical problems can affect the

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[3]. See Stehle (1977) and Stulz (1995,1999).

[4]. As a proxy for the world market portfolio we can think of the MSCI global index.

[5]. The beta coefficient is defined as the covariance between the asset and the market portfolio over the market portfolio's variance. Higher correlation leads to higher covariance, (recall the covariance formula).

[6]. Dependence must not be intended as synonym of correlation, although the two measures are not entirely different. To simplify, dependency happens when one value depends on the value assigned to another variable (independent). Instead, correlation is a relationship between one or more variable, generally assumed to be linear.

regressions and the coefficients' estimation, mainly data issues, while theoretical ones are the flaws that the CAPM assumptions present when applied to emerging markets and that can be inferred by making arguments in favor or against these assumptions.

The main technical problem faced in estimating the cost of equity through the CAPM is data availability to perform a consistent analysis from a statistical point of view. Nevertheless, as highlighted by Javier García-Sánchez *et al.* (2010), data must not only be available but also "dependable". Meaning that the local index must be a good proxy of the local market. Hence, it must represent several companies that operate in the country. In addition, the index must exhibit significant trading volumes and liquidity together with prices and returns that are realized in approximately free market conditions. A careful data selection might prevent these problems. Nevertheless, there are different empirical evidences[7] proving that, in the emerging economies, the total risk premium is explained mainly by local factors. While, in developed countries, the risk premium is mainly due to global factors. If this is true, the basic CAPM can't be applied to the emerging markets. The last technical issue is relatively simple. Harvey (2001) highlights that the beta is an appropriate measure of risk if the expected returns and risks are constant, given that the CAPM is a one period model. This is unlikely in emerging markets, as highlighted by Mohamed E. H. Arouri *et al.* (2012) and Aswath Damodaran (2009). After explaining these "technical" problems, we can better understand why the assumptions behind the CAPM are even more unrealistic in EMs. Most academics agree that, if we apply the global CAPM[8] to emerging markets, we are implicitly assuming that the market is reasonably integrated with the developed economies. From the empirical evidences already provided, it's clear that this assumption can't hold for most EMs. This problem leads to a violation of one of the main CAPM assumptions: Investors are broadly diversified in a wide range of investments. As Mohamed E. H. Arouri *et al.* specify, if markets are not completely integrated some investors will not hold certain types of assets that are available in a partially integrated country. Hence, the world market portfolio, as defined in the traditional CAPM, is not efficient because it doesn't reflect all available assets in the market. Moreover, the local investor will not be able to diversify local risks, which is therefore undiversifiable. Several papers discuss this limited diversification possibility. Taking the classification presented by Magnus P. Horn *et al*. (2015), we must distinguish between theoretical diversification and real diversification possibilities. Theoretical diversification possibilities in emerging markets are limited by several factors. Examples are direct barriers such as institutional barriers, or indirect barriers, defined as all the peculiarities of a country that can affect investors' perception of the

[7]. For a detailed description of how these effects have been measured look at Phylaktis Kate, and Lichuan Xia, 2006.

[8]. We would like to specify that the global CAPM can be applied with any proxy of the global market portfolio. Whether this is the MSCI Global or the S&P 500. The point is to provide reasonable explanation for why one is used instead of another.

risks in investing in that specific country. [9] However, this doesn't guarantee that investors will diversify diversifiable risks. Real diversification possibilities can be affected by behavioral biases which limit agent's real diversification despite the theoretic diversification possibilities. An extensive analysis of these behavioral biases is available in the research by K. Ardalan (2019). Another theoretical issue, proved by García-Sánchez *et al.,* is that the CAPM assumes the returns to be normally distributed, without significant skewness and kurtosis. However, we have seen that this is not the case.

2.3 Country Risk Premium adjustment

The literature background leads to one conclusion: if investors can't hold a perfectly diversified portfolio, their risk premium (defined as excess equity return) will not be related to the world market portfolio only, but also to other risk factors that must be priced. Mohamed E. H. Arouri *et al*. prove[10] that if some investors can't hold a globally diversified portfolio, all the remaining investors are unable to hold that portfolio. Hence, there is a portion of domestic risk that must be priced, defined as "undiversifiable domestic risk". This reasoning led most academics and practitioners to the estimation of a risk measure that takes into consideration specific peculiarities of a given location.

This measure is known as Country Risk Premium and it's widely used in practice, despite some academics argue that this risk premium should not be added to the cost of capital[11] but reflected in cash flows. In order to apply this approach consistently with theory, we need to know which types of risks the CRP measure reflects. Unfortunately, as proven by Batool K. Asiri and Rehab A. Hubail (2014), the background literature lacks a unique definition of country risk premium. The problem is that this clarification strongly depends on how this measure is estimated. A general definition is provided by Duff & Phelps in the "International Guide to Cost of Capital" (Wiley, 2017 ed.). The country risk premium is defined as: "the incremental risk premium associated with investing in a foreign country (i.e., the investee country; the country in which the investment is located) other than the home country (i.e., the country in which the investor is based.)". Following Harvey's study (2004), we can define this incremental risk premium with three variables: political risk, economic risk and financial risk. Which represents the willingness of a country to pay (political risk) and its ability to pay (economic and financial risk). This definition is supported by other academics like Vij and Kapoor (2007) who documented a significant

[9]. Following the international country risk guide, we can define these risks as, for example, government stability and corruption, external and internal conflict, democratic accountability, religion or military in politics etc…

[10]. The statistical computations are not reported here due to their length and complexity. If interested, please refer to Mohamed E.H. Arouri, Duc K. Nguyen, Kuntara Pukthuanthong, 2012, "An International CAPM for Partially Integrated Makets: Theory and empirical evidence", Journal of Banking & Finance 2012 pp. 2476/2478.

[11]. See Javier García-Sánchez, Lorenzo Preve, Virginia Sarria-Allende, "Valuation in Emerging Markets: A Simulation Approach", Journal of Applied Corporate Finance, 2010 pp. 100.

effect on country risks by macroeconomic, financial and political factors. However, other academics define the same factor differently. As an example, Pampush F. (2018) defines country risk as a measure for political rather than economic and financial risks. At the same time, Nagy P. J.[12] defines country risk as predominantly affected by economic and financial risks. Despite these differences, we can find some consistencies in the broad definition of country risk, for which is defined as the probability of a country to repay or fulfil[13] its obligations toward foreign lenders or investors.

Our study aims to reduce the confusion and disagreement regarding the country risk premium definition through a detailed analysis of the CRP estimation possibilities. Moreover, the research is going to investigate whether a CRP adjustment to the GCAPM provides significant improvement compared to the global CAPM. Hopefully, this study will help to align academics' theory and practitioners' methodologies.

3. Country Risk Premium Estimates and Hypotheses Development

After acknowledging that there should be a country risk premium estimation when measuring the cost of capital for companies or projects, we can explore the CRP estimation methodologies and their assumptions. In describing the best-known CRP estimation methods, we refer to the papers of Harvey and Damodaran, [14] which provide extensive summaries of these measures. Although there are several models that try to take into consideration higher risks exposure in emerging markets, these authors define three broad classes that lead to a CRP estimation: market-based measures; sovereign rating attached to a country by a rating agency; measures of country risk based on economic, political and financial risk provided by private institutions.

The most popular measures among practitioners are the market-based measures, meaning: the so called "Sovereign spread" or "Bond default spread" ("SS"); Credit Default Swap Spreads ("CDSS"); Relative volatility measure ("RV").

Rating based measures are mainly used for countries for which market measures can't be applied. Ratings are translated into numbers in different ways. Erb, Harvey and Viskanta (1996) propose an implied

[12]. See Nagy, P. J. (1988), "Country risk: How to assess, quantify, and monitor it", London: Euromoney Publications.

[13]. Notice the difference between repay and fulfil. Repay refers to contractual obligations in money terms, while fulfil considers all types of contractual obligations, like comply with property rights.

[14]. See Harvey, Campbell. R., 2005, "12 Ways to calculate the international cost of capital." and Damodaran, Aswath, 2018, "Equity Risk Premiums (ERP): Determinants, Estimation and Implications The 2018 Edition".

sovereign spread[15] ("ISS") in situations where only the country's rating is available. [16] Alternatively, Magnus P. Horn *et al*. (2015) compute the rating-induced market measure through an exponential regression.[17] Regarding countries that don't have risk ratings, another possibility is to look at private risks' measures such as the International Country Risk Guide ("ICRG") and compute the implied country risk premium following the methods outlined above.

3.1 Sovereign Spread Measure

The SS measure is computed as the difference (spread) between the subject country's government bond yield for U.S. dollars denominated bonds and the U.S. treasury bond yield. There are several pros and cons in applying this measure. Most of the empirical evidences support the theory for which government debt and macroeconomic fundamentals have an impact on government bond's yields. However, the SS measure captures also important country-specific characteristics. Empirical support is provided by Eichler S. (2014), who also found evidence that country-specific political characteristics significantly affect the SS. [18] Nevertheless, using the SS as a proxy for the CRP is not as straightforward as it looks. García-Sánchez *et al.* (2010) are doubtful whether the implicit assumptions when using this measure are plausible. Precisely, presuming that the SS correspond to the CRP it's equal to say that the additional risks of the project's cash flow are comparable to sovereign bonds risk. This is against the standard finance rules for which equities are always riskier than bonds. Moreover, bonds' yield captures two aspects: probability of default and expected recovery rate. Hence, if we apply this proxy as a CRP measure we are assuming that the default probability is the same as the probability of an economic crises[19] and that the sovereign bondholders' recovery rate is the same as the shareholders' one.

3.2 Credit Default Swap Spread

Credit default swaps are the most popular credit derivatives nowadays. In June 2018 the total credit derivatives market was 4.2 trillion of dollars, with the CDS share equal to 87.62% (3.68 trillion of

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[15]. The proposed model is based on the SS measure. However, the same logic can be applied to other measures. For example, Harvey itself suggests that this methodology can be applied in order to extrapolate an implied relative volatility measure (Harvey, Campbell. R., 2005, "12 Ways to calculate the international cost of capital.").

[16]. For the calculation details please refer to Erb, Claude, Campbell R. Harvey and Tadas Viskanta, 1996, "Expected returns and volatility in 135 countries".

[17]. Details regarding how the regression is specified has not been found in the paper.

[18]. For example, presidential regimes are found to have lower SS compared to parliamentary ones, due to the higher ability to take unpopular decisions in facing a crisis.

[19]. This assumption may not be so strong in emerging countries, but it is for developed markets.

dollars). [20] This measure is simple to apply, as the CRP estimate is directly taken from the market by looking at the CDSS. Moreover, Niso Abuaf (2015) argues that Credit Default Swaps (CDSs) are more liquid contracts compared to the dollar-denominated bonds, especially in emerging markets. Hence, this measure is a more reliable indicator of an emerging market risk. The background literature[21] confirms that CDS spreads are driven by both global and local factors and that the relative impact of each of them varies over time. Caceres and Segoviano's research (2010) demonstrates that during the beginning of a crisis, global factors are stronger determinants of the CDSS. As the crisis develops, country-specific factors become more important. From these evidences we can say that the CDSS reflects economic and political instability, [22] but it's doubtful whether this instability is more linked to local factors than global ones.

3.3 Relative volatility measures

The last market measure is based on the idea that the equity risk premium is an indicator for equity risk, which is measured by the volatility of the market (Damodaran, 2018). For this reason, a common approach is to multiply the equity risk premium of a given country X, by the ratio between the standard deviation of the country X against the standard deviation of a benchmark country, such as the US. In this way, the equity risk premium can be adjusted through the relative volatility of a country. If the emerging countries are riskier, their volatility should be higher than the one of the US, resulting in higher equity risk premium given the higher risk. The relative volatility replaces the beta measure given that the volatility in an emerging country is assumed to be higher than the covariance of the emerging market with the global portfolio proxy.

We can see why this estimate is intuitively sound. If we assume that the systematic risk is the same across all countries, the ratio between one country X and an idiosyncratic risk-free country's volatility (such as the U.S) will give back a measure which reflects the idiosyncratic risk of the country X. However, there are some drawbacks highlighted by Duff & Phelps (i.e. the ERP adjustment applies only if the stock market of the country is diversified).

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[20]. Data taken from the U.S Comptroller of the Currency. Available at https://www.investopedia.com/terms/c/creditdefaultswap.asp

[21]. See Bernie and Fratzscher (2013), Remola et al. (2008), Carlos Caceres and Segoviano (2010), Arghyrou and Kontonikas (2012), Patrick Augustin (2014).

[22]. Carr and Wu's (2007) research proves that economic and political instability have an impact of the sovereign credit quality, leading to higher CDSS.

3.4 Hypotheses development

The background literature clearly recognizes that there is a certain degree of country-specific risk which should be priced by the market, given that it's undiversifiable. We have seen that this diversification constraint is due to economies being poorly integrated in the world capital markets. Does this diversification constraint apply to investors located in more developed and integrated markets? In the research about the Equity Risk Premium, Damodaran (2018) points out that the country risk needs to be country-specific. However, correlation between countries has increased and it's likely to follow this trend in the future. Therefore, a portion of country-specific risk will be market risk, which is undiversifiable and commands a premium. For these reasons, consistently with Mohamed E. H. Arouri *et al.* (2012), we assume that if some investors are unable to hold the global market portfolio, also the remaining investors will be unable to hold that portfolio and to fully diversify the country-specific risk. In this way, all the investors in developing or developed markets will be unable to diversify some country-specific risk. Hence, we are also assuming that the country risk premium captures some risks that are likely to be present also in developed countries. [23]

H_0: the country risk premium is significant in both developed and emerging markets when it's added as a factor in the Global CAPM model

H_1: the country risk premium is insignificant in both developed and emerging markets when it's added as a factor in the Global CAPM model

The main hypothesis that we are going to test during the analysis should be clear now. Given that country risk is priced, we expect a CRP adjustment to the CAPM model to improve the basic CAPM explanatory and predictive power of the market excess returns.

H_0: the country risk premium increases the R^2 and Adjusted R^2 of the Global CAPM model.

H_1: the country risk premium does not increase the R^2 and Adjusted R^2 of the Global CAPM model.

[23]. Some of the risks mentioned so far and that are likely to be both for emerging and developed markets are: corruption, socioeconomic conditions, government stability, debt as a percentage of GDP, exchange rate stability, GDP per head, inflation rate, potential output growth etc…

This adjustment is going to be done in three different ways with different CRP estimates. Another important hypothesis concerns the difference between emerging and developed countries. Emerging countries should have a substantial amount of country-specific risk which should be priced by the market but should not be taken into consideration by the global benchmark portfolio. Hence, we expect the regression output to reflect the differences in the undiversifiable risks in these two different types of economies.

H_0: the country risk premium significance and R^2 improvement should be higher for the emerging markets compared to the developed ones.

H_1: the country risk premium significance and R^2 improvement does not depend on the type of market.

4. Methodology and data sample

We are going to use the MSCI World as a proxy for the global market portfolio. The reason why we chose the MSCI as a global market portfolio proxy is because of its higher coverage of global equity markets. The MSCI world index comprises large and mid-cap equities over 23 developed markets, representing approximately 85% of the developed countries' market capitalization. [24] In addition, the index has a neutral exposure to most of the factors that drive risks and returns, such as the size or value premium.

4.1 Multicollinearity check

The first check that we need to do concerns the multicollinearity between the different CRP measures (SS, CDSS, RV) and the MSCI. Given that multicollinearity leads to several issues, [25] it's a sound practice to always control for this phenomenon before running the analysis. However, in our research the multicollinearity between the CRP and the MSCI would also imply that the two factors capture same risks. The test that we are going to apply to control for this phenomenon is simple. To measure the multicollinearity, we will use the Variance Inflator Factor (VIF), computed as $\frac{1}{\text{Tolerance}}$ where Tolerance=1-R^2. The R^2 is the coefficient of determination[26] obtained by regressing one covariate on all

[24]. Data taken from MSCI World Index description provided by the MSCI website. If interested please look at: https://www.msci.com/documents/10199/178e6643-6ae6-47b9-82be-e1fc565ededb

[25]. If interested, look at Jamal I. D., 2017.

[26]. Defined as one minus the residuals sum of squares over the total sum of squares.

the other covariates. The higher is the R^2 the better are the explanatory variables in explaining the variance of the independent variable, which in this case is another explanatory variable. CRP estimates will be used with a 12 months lag. We took this decision because we noticed that the companies' returns average correlation with the CRPs is negative. Although unexpected, the result is intuitively sound. The sovereign spread (Palić P., Šimović Posedel P. and Vizek M., 2017), credit default swap yields (Bouzgarrou H, Chebbi T., 2016), and equity market's volatility (Athukoralalage K. I., Valadhani A., O'Brien M., 2010) tend to rise when there are economic, political or financial instabilities either in the country or globally. These instabilities, which boost the country risk premium, put a downward pressure on stock prices, resulting in negative returns and explaining the negative correlation. The average correlation turns positive if we lag the CRP by 12 months. While this assumption would require further investigations, we can draw from this empirical evidence that the CRP is a long-term premium that requires time in order to be effective. Hence, in our study we will apply a 12 months lag.

4.2 Hypotheses testing

After the multicollinearity check, we are going to test our hypotheses. We will apply the sovereign spread, credit default swap spread and relative-volatility, computed by taking the ratio between the volatility of country j equity market and the volatility of the S&P500 and extrapolating the implied country risk premium. In order to test the hypotheses stated in the previous chapter, we will perform three different regressions with the three CRP measures for the selected countries. These regressions, suggested by Damodaran (2003), embed the CRP to the Global CAPM in different ways and with different assumptions. The first regression is the simplest way to account for the CRP while estimating the cost of equity of a company. In this method, the CRP is added as a constant to the GCAPM model, with the implicit assumption that every company has the same exposure to country risk.

Model 1:

$$R_{i,t} = R_{f,t} + \beta_i * (R_{MSCI,t} - R_{f,t}) + CRP_{j,t-12} \qquad (1)$$

Where $R_{i,t}$ is the return of company i at time t, $R_{f,t}$ is the risk-free rate at time t, $R_{MSCI,t}$ is the MSCI return at time t and $CRP_{j,t-12}$ is the country risk premium of country j with a 12 months lag.

The second approach allows each company to have a different exposure to the CRP. The country risk premium estimate is added to the market risk premium, in this way the company's exposure to country-specific risks is measured by the β. This model implies that the CRP is another market risk, such as the interest rate risk, currency risk or equity risk (Abramov V. *et al,* 2017). Given that this measure is used for estimating the cost of equity of a company, this assumption looks consistent with the objective.

Model 2:

$$R_{i,t} = R_{f,t} + \beta_i * (R_{MSCI,t} - R_{f,t} + CRP_{j,t-12}) \qquad (2)$$

The last approach suggested by Damodaran is to add the CRP to the GCAPM equation as a separate factor. In this way the company's exposure to country risk is measured by a separate coefficient, lambda (λ), with the advantage of being able to assess the company's sensitivity to both market risks and country-specific risks separately. We are going to estimate the lambda as the covariance between the company's return and the country risk premium, over the country risk premium variance, like the β factor. The reason why we preferred this approach is due to our hypotheses. By estimating the lambda as a regression coefficient, we can assess the CRP significance in explaining equity returns, verifying our first hypothesis.

Model 3:

$$R_{i,t} = R_{f,t} + \beta_i * \left(R_{MSCI,t} - R_{f,t}\right) + \lambda_i * (CRP_{j,t-12}) \qquad (3)$$

While performing these regressions we will control for companies' size premium measured by the market capitalization of each company. We chose to control for this premium because of data constraints. [27] For this reason, we will follow the Fama-French (1993) method, creating two portfolios by sorting the companies for their market cap. The difference between the small companies' portfolio and the big companies' portfolio[28] is the implied size premium. We will apply the linear regressions to a set of companies' returns time series for each selected country. After running these regressions, we will infer about our hypotheses.

4.3 Robustness check

If our null hypotheses are confirmed, the country risk premium improves the Global CAPM explanatory power of companies' excess return. Moreover, this improvement will be higher for emerging markets, suggesting that in these countries there's a higher degree of country-specific risks. We thought to perform a simple robust check to confirm that the country risk premium is priced by the market and it's rewarded

[27]. See the paragraph data selection.

[28]. Big/small companies' portfolio comprises companies in the highest/lowest quartiles of the market cap. distribution.

with an excess return. This robust check consists of building two equally weighted portfolios with twenty companies each. In building these two portfolios (portfolio 1 = Emerging companies, portfolio 2 = Developed companies), we will follow the advices of Aragon and Ferson (2006) in their study about the portfolio performance evaluation. Hence, we will build the two portfolios in order to remove any differences in the characteristics that can affect the excess returns of a portfolio, by controlling the selected companies for: [29] Market capitalization (size premium), Price over book value ratio (value premium), Illiquidity[30] (illiquidity premium), Revenues concentration in the home country, Industry classification. Hence, the two portfolios will have companies with similar characteristics, ensuring the same exposure to different risk premiums and isolating the effect of the country risk premium. To compare the portfolios' performance, we will compute the cumulative return over ten years. In doing so, we are going to assume not only that the monthly returns are reinvested for the following month, but also that the portfolio is monthly rebalanced.

4.4 Data selection method

Firstly, we are going to randomly select thirty countries, developed and emerging, that have listed companies in one or more local equity market. Secondly, because we want to isolate the effects of country-specific risks, we will search for the first twenty companies[31] that have the highest average daily volumes, with more than 80%[32] of revenues in the company's geographic location. In picking our companies, we are going to avoid over exposure to one or more industries by diversifying the industry classification of the companies. Regarding the CRP measures that we are going to apply, the monthly credit default swap spread will be taken from Bloomberg, while the sovereign spread measure and the relative volatility measure will be provided by Duff & Phelps. These estimates are updated by Duff & Phelps quarterly, meaning that we will have four observations per year. In order to perform our analysis with monthly data, we will assume that the country risk premium changes quarterly. [33] Also, we chose to control for the size premium computed as explained in paragraph 4.2 (Hypotheses testing). Once we have selected our companies, we will download monthly adjusted returns from capital IQ for each

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[29]. We took these company's measures as a proxy for the company's exposure to factors that affect stock's returns. In doing so, we followed the review of Zaremba and Konieczka, 2014.

[30]. Measured by the ILLIQ measure defined by Amihud Y., 2002. ILLIQ is calculated as the yearly average of the daily absolute stock returns over the daily volumes: $\frac{1}{D_{year}}\sum_{i=1}^{Dy}\frac{|R_{i,t}|}{DVOL_{i,t}}$.

[31]. When available, twenty is the upper limit to the number of companies that we will select for all countries.

[32]. The threshold 80% is a judgment call, what we are going to look for companies that have most of their revenues in their home country in order to expect some exposure to the country risk premium.

[33]. This assumption is applied when using the sovereign spread measure and the relative volatility measure, given that the credit default swap monthly spread is taken from Bloomberg.

company for eight years. The stock's returns are adjusted for stock splits/repurchases and dividends payments. We followed the same procedure for the MSCI returns and the risk-free rate, which for our analysis is assumed to be the U.S three-month treasury bill rate (Mukherji S., 2011).

5. Empirical analysis evidence

In this analysis the reader must keep in mind that when we refer to a country, we are implicitly referring to the set of companies which represent that country in this study. Before testing our hypothesis, we are going to describe the dataset obtained by applying the companies screening method described in chapter four. Table 5.1 presents an introduction to the dataset per country.

TABLE 5.1

Companies' screening method output				Market Capitalization			
Country	N of Companies	Avg. Revenue Concentration	Avg. ILLIQ	Mean	Median	Standard dev.	Coefficient of Variation
Australia	20	100%	13%	1,759	211	3,075	175%
Brazil	20	98%	4%	9,726	5,586	15,779	162%
Canada	17	90%	6%	15,989	9,551	15,438	97%
Chile	13	81%	4%	6,260	4,139	6,695	107%
China	20	86%	0%	20,840	2,977	53,487	257%
Colombia	10	72%	27%	7,760	574	18,239	235%
Denmark	15	37%	17%	13,385	6,422	25,746	192%
Egypt	19	97%	7%	682	456	1,046	153%
India	20	92%	4%	5,630	3,167	7,432	132%
Indonesia	20	100%	2%	2,874	1,518	5,388	187%
Israel	12	65%	3%	7,095	2,621	10,313	145%
Italy	18	67%	8%	2,036	1,745	1,428	70%
Japan	20	94%	2%	14,564	6,327	20,701	142%
Malaysia	20	97%	6%	2,301	611	4,335	188%
Mexico	13	89%	6%	5,493	3,774	5,564	101%
New Zealand	15	79%	16%	2,036	1,745	1,428	70%
Nigeria	20	99%	22%	528	105	1,129	214%
Norway	7	62%	18%	1,992	1,942	1,873	94%
Pakistan	19	96%	13%	833	293	1,667	200%
Peru	12	84%	31%	1,687	1,322	1,719	102%
Philippines	20	98%	2%	1,529	188	2,752	180%
Poland	15	78%	16%	5,162	3,238	4,414	86%
Romania	5	80%	52%	1,249	45	2,473	198%
Russia	20	99%	18%	2,688	971	4,373	163%
South Africa	20	92%	15%	3,130	2,227	3,499	112%
South Korea	20	90%	11%	3,452	761	6,058	176%
Spain	14	80%	15%	7,955	3,159	9,726	122%
Sweden	12	87%	25%	1,919	1,811	1,598	83%
Thailand	20	98%	1%	3,067	1,052	4,028	131%
Turkey	18	94%	11%	1,653	115	3,497	212%

The intrinsic characteristics of the selected countries limit the number of companies suitable for this analysis. [34] For example, Nigeria's equity market is not yet developed, and the amount of trading volumes is low, resulting in an ILLIQ value for the selected companies of 22.3%.[35] Another example is Denmark, where the average revenue concentration is 37%. The value is not surprising, given that Denmark is a small country and there are few listed companies with 80% of revenues concentrated in the country.

5.1 Summary statistics

After a quick introduction, we can analyze the dataset for every country. Table 5.2 (in appendix, for the first 10 countries only) shows the summary statistics for every country. By looking at the mean and median we can see that out of 21 emerging countries 13 exhibit a slightly positive skewness. This effect in the emerging markets was pointed out by García-Sánchez *et al*. (2010) as one of the pitfalls in applying the global CAPM to the emerging countries. [36] Moreover, the developed countries, except Australia and South Korea, have a standard deviation lower than 7%, while all the emerging countries exhibit a standard deviation higher than 7%, consistently with theory. Linked to this, the emerging countries show a significantly higher average country risk premium, both for the sovereign measure, credit default swap measure and relative volatility measure. This result confirms that the CRP measure effectively discriminate between emerging and developed countries by assigning higher risk to the formers. In chapter 4 we suggested that the companies screening method was likely to give back small companies. This expectation is confirmed by the data. If we take a market capitalization of 2,407[37] millions of dollars as the upper bound limit for a small cap company, 19 countries out of 30 have a median market capitalization lower than this threshold (Table 5.1). In our sample, 24 countries out of 30 exhibit a coefficient of variation in the market cap higher than 1, threshold which suggests that there is a strong variability in the companies' market cap and it's sound to control for the size premium

5.2 Multicollinearity result and model diagnostic examples

The first test applied is the multicollinearity check between the CRP measures and the variables that we are going to use in our regressions: the MSCI and SMB factor.

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[34]. Recall that the countries have been selected randomly. The implicit assumption is that the results of the study don't depend on the country's characteristics.

[35]. Recall how the ILLIQ measure is computed. An ILLIQ value of 22.3% means that for every unit of traded volumes the stock price is affected by a 22.3% variation. The volumes unit of measure is millions of shares, hence, for one million of shares traded (per month), the average impact on the Nigeria's companies' stock price is 24%.

[36]. We mitigated this effect by computing the companies' log returns (Feng et al., 2014)

[37].The average market capitalization in the Russell 2000 Index, which combines the small-cap companies in the Russell 3000 Index. https://research.ftserussell.com/Analytics/FactSheets/temp/6108c77b-89b0-45b1-a776-b683e9298a24.pdf

As we can see from Table 5.3 (in appendix), all the VIFs are close to 1, suggesting that there is no multicollinearity between our explanatory variables. The RV measure has the lowest multicollinearity with the MSCI, which could suggest that the relative volatility measure captures mainly country-specific risks, with no double-counting effect with the MSCI. However, all the VIFs are close to 1 and the RV measure is the one that mostly differ from the other two estimates. Hence, we can only say that adjusting the Global CAPM for the CRP is statistically sound, as the two variables are almost orthogonal.

5.3 Lambda's significance

Now that we are comfortable in running the regressions' equations on our data, we can check if our hypotheses are verified. We will start from the null hypothesis 1: the country risk premium is significant in both developed and emerging markets when it's added as a factor to the Global CAPM model. Table 5.4 (in appendix, for the first 6 country only) shows the outputs of the regressions tested in this analysis, namely equation number 1, 2 and 3. The beta is positive and significant for 25 countries out of 30, as expected. However, we can notice that the betas are all below 1 and for some countries close to low values as 0.26, the median of the companies' beta in Romania and Nigeria. This result for the emerging countries was anticipated by Harvey's study (2001), were the researcher documented no relation between the estimated betas and the emerging countries returns. [38] However, we can notice low betas also in some developed countries. The size premium is found to be significant for 20 companies out of 30 with a positive sign for 26 countries, suggesting positive exposure to this premium. This confirms that in our dataset we have several small companies and it could be another reason for the low betas obtained in some developed countries. Moving to the CRP estimates, in order to test our first hypothesis we have to look at table 5.5 (see next page), which shows the outputs of regression number 3. Unfortunately, the CRP is found to be significant only for Brazil, where the lambda for the relative volatility measure is positive and significant (0.74) at 10% significance level. However, we will come back on the lambdas' significance in the last paragraph of this chapter. What can be concluded from this result is that the CRP isn't significant for most of the companies in each of the emerging and developed companies. Hence, we need to reject the null hypothesis in favor of the alternative hypothesis: the country risk premium is insignificant in both developed and emerging markets when it's added as a factor to the Global CAPM. If the lambdas aren't significant, then the CRP estimates don't improve the GCAPM explanatory power of stocks' returns variance. Regarding the intercept significance, without going through the details, a positive significant intercept suggests that a portion of the equity returns which is not explained by either

[38]. See paragraph.

the MSCI, CRP or SMB. Implying that the CRP is too low for New Zealand and China. Following the same reasoning, a negative significant intercept suggests that the CRP is too high for Colombia, Russia and Turkey. The conclusion doesn't change also by looking at model 2.

TABLE 5.5

	CDS Spread				Relative Volatility			
	α	β	SMB	λ	α	β	SMB	λ
Australia	0.00	0.54	0.31**	-0.06	-0.02	0.47	0.36*	0.31
Brazil	-0.01	0.90***	-0.20	-0.06	-0.03*	0.89***	-0.22	0.74*
Canada	0.00	0.54***	0.24***	0.02	0.00	0.53***	0.24***	0.16
Chile	0.00	0.72***	0.26***	-0.06	-0.01	0.70***	0.25**	0.51
China	0.02**	0.47	0.46***	-0.01	0.01	0.45	0.46***	0.08
Colombia	-0.01	0.63**	0.02**	-0.02	-0.01	0.63**	0.02**	0.07
Denmark	0.01	0.48**	0.09**	-0.01	0.01	0.48**	0.08**	0.20
Egypt	0.00	0.62*	0.51**	-0.08	0.01	0.61*	0.52**	-0.05
India	0.00	0.61*	0.29*	0.16	0.01	0.66**	0.41***	-0.33
Indonesia	-0.01	0.45*	0.53***	-0.03	-0.01	0.43*	0.52***	0.15
Israel	0.00	0.52***	0.30***	-0.04	0.00	0.52***	0.30***	0.20
Italy	0.00	0.87***	0.18	0.07	0.00	0.87***	0.18	0.22
Japan	0.00	0.48***	0.20***	-0.02	0.00	0.48**	0.20***	-1.09
Malaysia	-0.01	0.92***	0.15	0.03	-0.01	0.95***	0.12	0.13
Mexico	0.00	0.69***	-0.01	-0.05	-0.01	0.67***	-0.01	0.36
New Zealand	0.00*	0.49***	0.08	0.01	0.01	0.49***	0.08	-0.18
Nigeria	-0.02	0.21	-0.36	-0.11	-0.02	0.24	-0.25*	0.30
Norway	0.01	0.75***	0.14*	-0.01	0.00	0.72***	0.14*	0.32
Pakistan	0.01	0.31	0.14	0.11	0.01	0.29	0.14	-0.04
Peru	0.00	0.55*	0.18*	0.05	0.00	0.58*	0.19*	-0.20
Philippines	0.00	0.5**	0.02*	0.01	0.00	0.48**	-0.04*	0.08
Poland	0.00	0.63***	-0.11	0.01	-0.01	0.62***	-0.10	0.16
Romania	0.00	0.22	0.16***	-0.04	0.00	0.20	0.15***	0.18
Russia	-0.02**	0.85**	0.22*	-0.03	-0.04**	0.88***	0.22**	0.46
South Africa	-0.01	0.7**	-0.18*	-0.03	-0.01	0.71**	-0.16**	0.23
South Korea	0.00	0.72**	0.13	0.02	-0.01	0.73**	0.11	0.19
Spain	0.00	0.64**	0.10	0.01	-0.01	0.63**	0.09	0.48
Sweden	0.01	0.54***	0.03**	-0.01	0.00	0.51***	0.02**	0.52
Thailand	0.01	0.68**	0.05	0.03	0.01	0.68**	-0.02	-0.25
Turkey	-0.02	0.75*	0.01	0.01	-0.03*	0.73*	0.00	0.50

However, in model 3 we can offset this issue thanks to its assumption. In model 1 we assume that every company has the same exposure to country risk, while in model 2 the exposure to country risk is measured by the beta, together with the market risks. Instead, by assuming that every company has its own exposure to country-specific risks, we can extrapolate more information from the CRP measure. Resulting in decreasing the mispricing degree of the model. Hence, another possible reason to the intercept significance can be the assumption behind the models rather than a wrong CRP estimate.

5.4 CRP adjustment efficiency

Hypothesis 1 hasn't supported the CRP adjustment to the GCAPM. In this paragraph we will test hypothesis 2, to see if there's any empirical evidence which supports the CRP adjustment. The null hypothesis is the following: the country risk premium increases the R^2 and Adjusted R^2 of the Global CAPM model. In Table 5.6 (see next page) we can see the R^2 and Adjusted R^2 of each model, with the different CRP estimates, for every country. We would like to highlight few characteristics of these results before looking at the improvements in the Adjusted R^2. The last two columns show the R^2 and Adjusted R^2 for the benchmark model (equation number 1, 2 or 3 with CRP = 0). By looking at the R^2, we can see that the developed countries have a value higher than 20% except for Australia, Denmark, New Zealand and South Korea. Instead, the emerging countries have a R^2 lower than this threshold except for Chile, China and India. [39] Roughly, this difference in the GCAPM performance is explained by three variables: companies' returns standard deviation, ILLIQ and the coefficient of variation (CV) of the market cap in each country. Starting from the developed countries, Australia and South Korea exhibit a high standard deviation compared to the other developed countries[40] (14.76% and 9.71% respectively) together with a high CV (174.78% and 175.50% respectively) and average ILLIQ (13.44% and 10.98% respectively). For Denmark and New Zealand, although the standard deviation is in line with the other emerging countries (5.67% and 5.21% respectively), the illiquidity in the selected companies is high (17.33% and 16.48%). At the same time, the coefficient of variation is high for Denmark (192.36%) but low for New Zealand (70.14%), given that most of the companies are small. [41] This suggests that in these countries we have selected several small companies, with high risk and relatively low trading volumes. If we look at these characteristics and at the literature review in chapter 2, we can say that these companies look more like companies in an emerging country rather than a developed one. [42] The same reasoning, reversed, applies to the emerging countries (i.e. Chile, China and India).

[39]. Romania's Adj. R2 is 26.5%, which is high for an emerging country. However, we only have 5 companies in our sample and the high value is due to the Adj. R2 of one company, which is 75.07%. If we remove this outlier from the Romania's sample, the value goes to 18.08%, more in line with the other emerging countries.

[40]. This was already pointed out in paragraph 5.1-Summary statistics.

[41]. Look at Table 5.1.

[42]. Look at paragraph 2.2-Technical and theoretical issues in applying the CAPM to emerging countries.

TABLE 5.6

	Model 1						Model 2						Model 3				Benchmark Model	
	SS		CDSS		RV		SS		CDSS		RV		CDSS		RV			
Country	R^2	Adjusted R^2	R^2	Adjusted R^2	R^2	Adjusted R^2	R^2	Adjusted R^2	R^2	Adjusted R^2	R^2	Adjusted R^2	R^2	Adjusted R^2	R^2	Adjusted R^2	R2	Adjusted R2
AUSTRALIA	16.12%	14.14%	16.23%	14.26%	16.21%	14.24%	16.23%	14.26%	16.23%	14.26%	16.30%	14.33%	18.20%	14.11%	17.75%	14.81%	16.24%	14.27%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.32%*	*0.38%*	*12.07%*	*0.00%*	*9.27%*	*3.78%*	*0.00%*	*0.00%*
BRAZIL	12.49%	10.43%	12.46%	10.40%	12.50%	10.44%	12.65%	10.59%	12.56%	10.50%	13.10%	11.06%	13.31%	10.22%	16.63%	13.65%	12.46%	10.40%
	0.22%	*0.26%*	*0.00%*	*0.00%*	*0.31%*	*0.38%*	*1.50%*	*1.84%*	*0.76%*	*0.93%*	*5.15%*	*6.32%*	*6.82%*	*0.00%*	*33.41%*	*31.20%*	*0.00%*	*0.00%*
CANADA	31.68%	30.07%	31.69%	30.09%	31.66%	30.05%	31.71%	30.10%	31.71%	30.11%	31.76%	30.15%	32.43%	30.02%	32.34%	29.93%	31.71%	30.10%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.01%*	*0.01%*	*0.02%*	*0.02%*	*0.15%*	*0.16%*	*2.28%*	*0.00%*	*2.00%*	*0.00%*	*0.00%*	*0.00%*
CHILE	23.92%	22.13%	23.92%	22.13%	23.96%	22.18%	23.93%	22.14%	23.95%	22.16%	24.07%	22.28%	26.35%	23.69%	24.63%	21.94%	23.95%	22.16%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.05%*	*0.06%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.50%*	*0.55%*	*10.01%*	*6.88%*	*2.82%*	*0.00%*	*0.00%*	*0.00%*
CHINA	24.28%	22.50%	24.27%	22.48%	24.22%	22.44%	24.25%	22.47%	24.27%	22.49%	24.26%	22.48%	24.77%	22.02%	24.49%	21.79%	24.26%	22.48%
	0.07%	*0.07%*	*0.02%*	*0.03%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.06%*	*0.06%*	*0.00%*	*0.00%*	*2.11%*	*0.00%*	*0.94%*	*0.00%*	*0.00%*	*0.00%*
COLOMBIA	17.66%	15.72%	17.67%	15.73%	17.63%	15.69%	17.83%	15.89%	17.76%	15.82%	17.68%	15.74%	18.04%	15.11%	18.11%	15.18%	17.68%	15.74%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.85%*	*0.98%*	*0.47%*	*0.54%*	*0.00%*	*0.00%*	*2.05%*	*0.00%*	*2.43%*	*0.00%*	*0.00%*	*0.00%*
DENMARK	15.08%	13.08%	15.09%	13.09%	15.09%	13.09%	15.13%	13.13%	15.15%	13.15%	15.13%	13.13%	15.44%	12.42%	15.93%	12.93%	15.11%	13.11%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.14%*	*0.17%*	*0.30%*	*0.36%*	*0.14%*	*0.16%*	*2.21%*	*0.00%*	*5.49%*	*0.00%*	*0.00%*	*0.00%*
EGYPT	17.96%	16.03%	17.98%	16.05%	17.92%	15.99%	17.95%	16.02%	18.05%	16.12%	17.93%	16.00%	19.12%	16.23%	18.51%	15.60%	17.97%	16.04%
	0.00%	*0.00%*	*0.05%*	*0.06%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.40%*	*0.46%*	*0.00%*	*0.00%*	*6.37%*	*1.17%*	*3.00%*	*0.00%*	*0.00%*	*0.00%*
INDIA	26.41%	24.68%	26.37%	24.64%	26.29%	24.56%	26.45%	24.71%	26.36%	24.62%	26.29%	24.55%	27.89%	23.56%	27.24%	24.65%	26.40%	24.66%
	0.07%	*0.08%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.19%*	*0.20%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*5.66%*	*0.00%*	*3.21%*	*0.00%*	*0.00%*	*0.00%*
INDONESIA	16.62%	14.65%	16.57%	14.60%	16.59%	14.62%	16.62%	14.66%	16.59%	14.62%	16.64%	14.67%	17.42%	14.28%	16.95%	13.98%	16.60%	14.63%
	0.12%	*0.14%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.15%*	*0.18%*	*0.00%*	*0.00%*	*0.24%*	*0.28%*	*4.97%*	*0.00%*	*2.13%*	*0.00%*	*0.00%*	*0.00%*
ISRAEL	20.87%	19.01%	20.90%	19.04%	20.94%	19.08%	20.91%	19.05%	20.93%	19.07%	20.96%	19.10%	21.64%	18.84%	21.47%	18.67%	20.91%	19.05%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.13%*	*0.15%*	*0.00%*	*0.00%*	*0.11%*	*0.12%*	*0.22%*	*0.25%*	*3.46%*	*0.00%*	*2.67%*	*0.00%*	*0.00%*	*0.00%*
ITALY	10.88%	8.78%	10.89%	8.79%	10.88%	8.78%	11.09%	9.00%	11.15%	9.06%	10.91%	8.82%	12.15%	9.01%	11.44%	8.28%	10.90%	8.80%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*1.78%*	*2.25%*	*2.34%*	*2.97%*	*0.18%*	*0.22%*	*11.51%*	*2.41%*	*5.01%*	*0.00%*	*0.00%*	*0.00%*
JAPAN	24.30%	22.52%	24.31%	22.53%	24.34%	22.56%	24.33%	22.55%	24.36%	22.58%	24.33%	22.55%	25.42%	22.76%	25.12%	22.45%	24.34%	22.56%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.05%*	*0.06%*	*0.00%*	*0.00%*	*4.43%*	*0.87%*	*3.19%*	*0.00%*	*0.00%*	*0.00%*
MALAYSIA	19.28%	17.38%	19.27%	17.37%	19.28%	17.38%	19.37%	17.47%	19.31%	17.42%	19.30%	17.40%	20.20%	17.24%	20.07%	17.22%	19.29%	17.39%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.42%*	*0.48%*	*0.15%*	*0.17%*	*0.09%*	*0.10%*	*4.73%*	*0.00%*	*4.08%*	*0.00%*	*0.00%*	*0.00%*
MEXICO	18.13%	16.21%	18.12%	16.20%	18.12%	16.19%	18.13%	16.20%	18.14%	16.21%	18.18%	16.26%	19.58%	16.71%	18.44%	15.53%	18.15%	16.23%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.17%*	*0.20%*	*7.89%*	*2.99%*	*1.59%*	*0.00%*	*0.00%*	*0.00%*
NEW ZEALAND	16.78%	14.82%	16.77%	14.81%	16.74%	14.78%	16.80%	14.84%	16.81%	14.86%	16.73%	14.77%	17.75%	14.81%	17.73%	14.79%	16.79%	14.83%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.06%*	*0.06%*	*0.16%*	*0.19%*	*0.00%*	*0.00%*	*5.71%*	*0.00%*	*5.59%*	*0.00%*	*0.00%*	*0.00%*
NIGERIA	7.38%	5.20%	7.39%	5.21%	7.40%	5.22%	7.36%	5.18%	7.29%	5.11%	7.42%	5.24%	9.86%	4.45%	8.19%	4.92%	7.37%	5.20%
	0.05%	*0.08%*	*0.16%*	*0.23%*	*0.37%*	*0.54%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.65%*	*0.94%*	*33.69%*	*0.00%*	*11.11%*	*0.00%*	*0.00%*	*0.00%*
NORWAY	20.97%	19.11%	20.97%	19.11%	20.92%	19.06%	20.97%	19.11%	20.99%	19.13%	21.11%	19.25%	21.75%	18.95%	22.48%	19.71%	20.97%	19.11%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.09%*	*0.10%*	*0.65%*	*0.73%*	*3.69%*	*0.00%*	*7.17%*	*3.11%*	*0.00%*	*0.00%*
PAKISTAN	15.59%	13.60%	15.58%	13.60%	15.47%	13.48%	15.69%	13.71%	15.81%	13.83%	15.52%	13.53%	17.73%	14.75%	16.23%	13.23%	15.53%	13.55%
	0.34%	*0.40%*	*0.33%*	*0.38%*	*0.00%*	*0.00%*	*1.01%*	*1.18%*	*1.77%*	*2.07%*	*0.00%*	*0.00%*	*14.13%*	*8.92%*	*4.46%*	*0.00%*	*0.00%*	*0.00%*
PERU	16.44%	14.47%	16.44%	14.48%	16.34%	14.37%	16.49%	14.53%	16.47%	14.50%	16.37%	14.40%	17.40%	14.45%	17.09%	14.13%	16.43%	14.47%
	0.03%	*0.03%*	*0.06%*	*0.07%*	*0.00%*	*0.00%*	*0.36%*	*0.42%*	*0.22%*	*0.25%*	*0.00%*	*0.00%*	*5.86%*	*0.00%*	*3.98%*	*0.00%*	*0.00%*	*0.00%*
PHILIPPINES	12.67%	10.61%	12.67%	10.61%	12.68%	10.62%	12.72%	10.66%	12.70%	10.64%	12.72%	10.67%	14.13%	10.95%	13.35%	10.26%	12.68%	10.62%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.28%*	*0.35%*	*0.14%*	*0.17%*	*0.35%*	*0.43%*	*11.45%*	*3.07%*	*5.33%*	*0.00%*	*0.00%*	*0.00%*
POLAND	17.10%	15.15%	17.09%	15.13%	17.05%	15.10%	17.21%	15.26%	17.21%	15.26%	17.17%	15.22%	17.38%	14.43%	17.70%	14.76%	17.12%	15.17%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.50%*	*0.58%*	*0.48%*	*0.56%*	*0.26%*	*0.30%*	*1.49%*	*0.00%*	*3.37%*	*0.00%*	*0.00%*	*0.00%*
ROMANIA	28.21%	26.52%	28.23%	26.54%	28.13%	26.44%	28.19%	26.50%	28.19%	26.50%	28.22%	26.53%	28.68%	26.13%	16.76%	13.79%	28.19%	26.50%
	0.07%	*0.08%*	*0.16%*	*0.17%*	*0.00%*	*0.00%*	*0.01%*	*0.01%*	*0.02%*	*0.03%*	*0.12%*	*0.14%*	*1.75%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*
RUSSIA	19.95%	18.07%	19.99%	18.11%	19.99%	18.11%	20.09%	18.21%	20.11%	18.23%	20.27%	18.39%	20.38%	17.46%	21.20%	18.38%	19.98%	18.10%
	0.00%	*0.00%*	*0.05%*	*0.05%*	*0.06%*	*0.07%*	*0.56%*	*0.63%*	*0.66%*	*0.74%*	*1.45%*	*1.64%*	*1.99%*	*0.00%*	*6.09%*	*1.57%*	*0.00%*	*0.00%*
SOUTH AFRICA	14.81%	12.81%	14.80%	12.80%	14.80%	12.79%	14.85%	12.84%	14.79%	12.78%	14.86%	12.86%	15.01%	11.90%	15.44%	12.42%	14.82%	12.82%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.14%*	*0.17%*	*0.00%*	*0.00%*	*0.27%*	*0.31%*	*1.25%*	*0.00%*	*4.14%*	*0.00%*	*0.00%*	*0.00%*
SOUTH KOREA	17.96%	16.03%	17.97%	16.04%	17.94%	16.01%	18.01%	16.08%	17.99%	16.06%	18.01%	16.08%	20.75%	17.78%	18.63%	15.73%	17.98%	16.05%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.18%*	*0.21%*	*0.10%*	*0.11%*	*0.21%*	*0.24%*	*15.43%*	*10.80%*	*3.65%*	*0.00%*	*0.00%*	*0.00%*
SPAIN	21.20%	19.34%	21.19%	19.33%	21.09%	19.23%	21.40%	19.55%	21.47%	19.62%	21.28%	19.43%	21.39%	18.59%	22.29%	19.52%	21.13%	19.27%
	0.31%	*0.35%*	*0.27%*	*0.30%*	*0.00%*	*0.00%*	*1.30%*	*1.46%*	*1.62%*	*1.82%*	*0.70%*	*0.79%*	*1.25%*	*0.00%*	*5.50%*	*1.26%*	*0.00%*	*0.00%*
SWEDEN	21.96%	20.12%	21.95%	20.11%	21.94%	20.11%	21.96%	20.12%	21.98%	20.14%	22.15%	20.32%	23.01%	20.26%	24.26%	21.55%	21.96%	20.12%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.10%*	*0.11%*	*0.90%*	*1.00%*	*4.79%*	*0.69%*	*10.46%*	*7.10%*	*0.00%*	*0.00%*
THAILAND	11.93%	9.86%	11.93%	9.86%	11.90%	9.82%	11.99%	9.91%	11.98%	9.91%	11.93%	9.86%	13.90%	10.55%	12.87%	9.76%	11.94%	9.87%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.36%*	*0.45%*	*0.30%*	*0.37%*	*0.00%*	*0.00%*	*16.42%*	*6.88%*	*7.77%*	*0.00%*	*0.00%*	*0.00%*
TURKEY	10.54%	8.43%	10.54%	8.44%	10.54%	8.43%	10.53%	8.42%	10.60%	8.49%	10.81%	8.71%	11.06%	7.88%	12.27%	9.14%	10.54%	8.44%
	0.00%	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.49%*	*0.62%*	*2.50%*	*3.20%*	*4.91%*	*0.00%*	*16.39%*	*8.28%*	*0.00%*	*0.00%*
AVG. ADJ. R^2 - TOT		*16.38%*		*16.39%*		*16.36%*		*16.44%*		*16.44%*		*16.46%*		*16.32%*		*15.96%*		*16.39%*
AVG. IMPROVEMENT - TOT		*0.05%*		*0.04%*		*0.04%*		*0.39%*		*0.43%*		*0.61%*		*1.49%*		*1.88%*		

After this consideration, we can test our second hypothesis. At the bottom of Table 5.6 we can see the average improvement of each model compared to the benchmark model. The improvement indicates the adjusted R^2 percentage increase of model 1, 2 and 3 over the adjusted R^2 of the GCAPM. It's clear that model 1 doesn't provide any improvement in the GCAPM explanatory power. This confirms that the assumption for which each company has the same exposure to country-specific risks is wrong and doesn't lead to any significant improvement to the Global CAPM. Model 2 improvements are better compared to model 1, with an average improvement of 0.39%, 0.43% and 0.61% for the CRP SS, CDSS and RV respectively. Not surprisingly, model 3 looks to be the best in terms of Adjusted R square improvements, with an average improvement of 1.49% and 1.88%. We can see that the more we allow each company to have its own exposure to country risk, the more the GCAPM is improved by the CRP adjustment. In doing so, the analyst or researcher can extrapolate the highest explanatory power from the CRP estimates. Therefore, given that the last 2 models bring an adjusted R^2 improvement, we can refuse to reject the null hypothesis. The CRP adjustment to the GCAPM increases the GCAPM explanatory power[43]. Before moving to the last hypothesis, we want to highlight some empirical evidences about how the three CRP estimates perform in the different models. As we can see from the numbers just described, in model 1 each CRP performs the same. Then, by allowing the companies to have different exposure to the CRP, the RV estimate emerges as the one that mostly improves the GCAPM explanatory power. However, this result is mainly driven by Brazil, where the CRP RV performs incredibly well. If we remove this outlier in the average computation of model 2, the average improvement would be in line with the other two estimates. In model 3, the average moves from 1.88% to 0.87%, significantly lower compared to the CDSS. Given this output, we can confirm that the relative volatility measure has some peculiarities in capturing country-specific risks indeed.

5.5 Emerging and developed countries' exposure to the CRP

At this point of the analysis, we reached a mixed evidence. The CRP adjustment to the global CAPM improves the model's explanatory power, but the CRP is not significant when is added as a separate factor. The last hypothesis that needs to be checked is important in order to confirm or reject the validity of the CRP adjustment. In the literature review we noticed that the GCAPM has power when applied to the developed countries, but the same doesn't apply to the emerging ones. Moreover, in the same paragraph we noticed how, in the emerging markets, country effects dominate global and industry effects in explaining equity returns. Hence, in order to be consistent with the past literature and support the CRP adjustment in emerging countries, the null hypothesis 3 must be verified. In testing hypothesis 1, we noticed that the CRP is not significant for almost all countries. Hence, there's no difference between emerging and developed countries. In testing hypothesis 2, our first observation was that, excluding some outliers, the developed countries have a R^2 higher than 20%, while for the emerging this value is lower. An average comparison between the R2 and Adjusted R2 for the emerging countries and the developed ones is available is available in Table 5.7. As we can see, the average Adj. R^2 for the developed countries

[43]. Although it's important to keep in mind that we are measuring the average improvement in terms of percentage and not percentage point. This means that the improvement is low, on a monthly time-frame.

is 3.44 percentage points higher than the emerging countries average, with a value of 18.80% compared to 15.36%. Moreover, the average improvement is higher for the emerging countries compared to the developed ones, confirming that in these countries there's a higher degree of country-specific risks, captured by the CRP. Hence, given that the CRP is not significant in both emerging and developed countries, we refuse to reject hypothesis 3.

TABLE 5.7[44]

	Model 1			Model 2			Model 3		Benchmark
	SS	CDSS	RV	SS	CDSS	RV	CDSS	RV	
AVG. ADJ. R^2 - TOT	*16.38%*	*16.39%*	*16.36%*	*16.44%*	*16.44%*	*16.46%*	*16.32%*	*15.96%*	*16.39%*
AVG. IMPROVEMENT - TOT	*0.05%*	*0.04%*	*0.04%*	*0.39%*	*0.43%*	*0.61%*	*1.49%*	*1.88%*	
AVG. ADJ. R^2 - EME	*15.36%*	*15.36%*	*15.33%*	*15.43%*	*15.42%*	*15.43%*	*15.22%*	*14.67%*	*15.36%*
AVG. IMPROVEMENT - EME	*0.07%*	*0.06%*	*0.05%*	*0.53%*	*0.56%*	*0.73%*	*1.54%*	*2.02%*	
AVG. ADJ. R^2 - DEV	*18.77%*	*18.79%*	*18.78%*	*18.80%*	*18.82%*	*18.85%*	*18.88%*	*18.95%*	*18.80%*
AVG. IMPROVEMENT - DEV	*0.00%*	*0.00%*	*0.02%*	*0.05%*	*0.12%*	*0.32%*	*1.37%*	*1.55%*	

It's interesting to notice how the emerging and developed markets difference in the Adjusted R^2 improvement, gets smaller and smaller from model 1 to model 3, where in model 3 the average improvement is just 12% and 30% higher. [45] This result is in line with the evidences described so far. The more we allow each company to have its own exposure to country-specific risks, the smaller is the difference between emerging and developed countries. This suggests that the real discriminant in the CAPM performance is not the type of market but rather the companies' characteristics. Hence, it looks like model 3 is the best one in adjusting the global CAPM for the CRP. However, an interesting pattern arises when checking the improvement in each country, without basing the conclusion on the average improvement. Model 1 is still the worst for the CRP adjustment, where the CRP improves in 22 cases (13 if we look only at CRP CDSS and CRP RV), but model 3 improves the GCAPM explanatory power only in 17 cases, 10 using the CRP CDSS and 7 using the CRP RV. Instead, if we look at model 2, the CRP adjustment improves the GCAPM explanatory power in 63 cases (44 if we look only at CRP CDSS and CRP RV). Therefore, it looks like model 2 is the best one in improving the GCAPM explanatory power. The average improvement is higher in model 3 because, when this model improves the GCAPM, the improvement is generally higher compared to model 2. At this point, the reader should have noticed an inconsistency in our results. We concluded that the CRP is not significant when it's added as a separate factor, in both developed and emerging countries. At the same time, model 3 boost the GCAPM

[44]. If we exclude the CRP RV performance in Brazil, the CRP RV average improvement (EME) is 0.45% and 0.56% in model 2 and model 3 respectively.

[45]. In model 2 the average improvement for the emerging countries compared to developed ones is significantly higher than in model 3.

explanatory power. How can model 3 improve the Adjusted R^2 of the GCAPM, if the only difference between these two models is the CRP factor, which is found to be insignificant? It must be that for some companies the CRP is significant. As expected, we found that, on average, around 15% of our companies exhibit a significant CRP. When there is no significant CRP, there's no improvement in the average Adjusted R^2 (Table 5.6).

In paragraph 5.5 we said that we would have come back on the lambdas' significance, while in paragraph 5.6 the R^2 and Adjusted R^2 analysis suggested that the real discriminants in models' performance were the companies' characteristics, roughly summarized by the stock's standard deviation, size and liquidity. There is evidence of CRP significance, [46] and this evidence is present in both developed and emerging market, without any significant difference between the two.

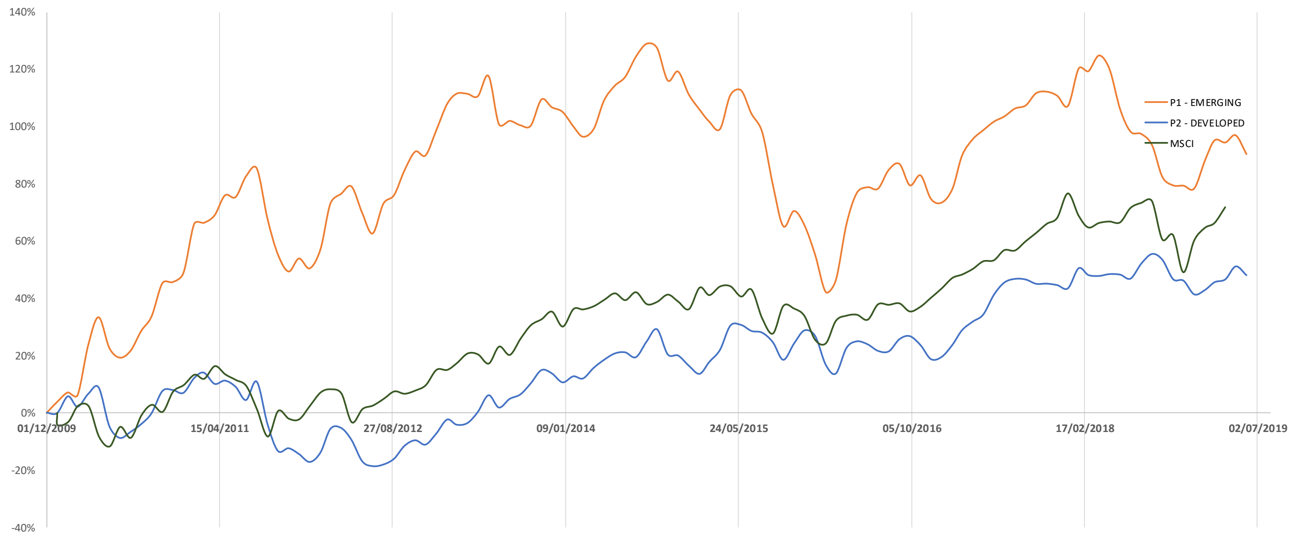
5.6 Robustness check result

From these results we can conclude that the CRP is an undiversifiable risk and it should be priced by the market consequently. Moreover, although the CRP is found to be significant in both developed and emerging markets, we noticed that the average CRP is higher in emerging countries. This because of the higher degree of country-specific risks. As explained in chapter 4, we built these portfolios by controlling for the factors that typically affect stock returns. There shouldn't be any difference in the exposure to the value and illiquidity premium and there is no revenues diversification effect. The market Cap. of the two portfolios is slightly higher for portfolio 2 (5,722 vs 4,446 mm USD), but we don't expect this difference to significantly affect the results. Moreover, every company in one portfolio, operating in a given industry, has its corresponding "competitor"[47] in the other portfolio.

[46]. Which also means that our first hypothesis can't be fully rejected.

[47]. Competitor in the sense that the two companies operate in the same industry.

FIGURE 5.2



The graph plots the two portfolios and the MSCI cumulative returns over time. As we can see, the emerging portfolio always outperforms, even when the emerging markets faced a distressed period[48]. The portfolio 1 annual average return is 7.91%, with an annual standard deviation of 15.46%. While portfolio 2 annual average return is 5.02%, with an annual standard deviation of 13.56%. Hence, the emerging portfolio outperforms the developed portfolio on a risk-adjusted basis (Portfolio 1 Sharpe Ratio = 0.51, Portfolio 2 Sharpe Ratio = 0.37). We saw that the emerging companies tend to have a higher standard deviation, on average. Higher standard deviation should lead to higher returns, and this is what we can see from this robust check.

6. Conclusion

In this research we studied the performance of three different models in explaining the companies' equity returns. These three different models embed the country risk premium to the Global CAPM in three different ways. Model 1 assumes that each company has the same exposure to the country risk premium. Model 2 assumes that the country risk premium is a market risk and should be measured by the beta consequently. Model 3 assumes that every company has its own exposure to country risk, which is measured with a separate factor. We tested the performance of each model using three different CRP estimates. The sovereign spread, credit default swap spread and relative volatility. Our first finding is

[48]. The Oil shock of 2014, the rising US interest rates etc. If interested look at: "The slowdown in emerging market economies and its implications for the global economy", ECB Research & Publications, article available at: https://www.ecb.europa.eu/pub/pdf/other/eb201603_article01.en.pdf?8788f4163f34986381809bde77f75298

that the CRP is more a long-term rather than short-term premium, which requires time in order to be effective. Moreover, the CRP is significant only for a minority of companies in our dataset and the significance does not depend on the type of country. However, model 2 and 3 enhance the R^2 and Adjusted R^2 of the GCAPM, increasing its explanatory power. At the same time, the three CRP measures perform almost the same, with the relative volatility estimate performing poorly compared to the CRP CDSS in model 3. Nevertheless, this improvement is found to be higher for the emerging countries compared to the developed countries. Moreover, in 25 cases out of 30 the CDSS and SS measures are close to each other. Regarding the RV measure, in chapter 3 we pointed out different estimation problems, especially in emerging markets. From this evidence and the arguments discussed in over the course of the analysis, we can't choose between the SS and CDSS, we can only conclude that the RV estimation must be carefully assessed. The assumption for which every company has its own exposure to country-specific risks is supported by this study, as model 3 provides the highest improvement to the GCAPM explanatory power. Meanwhile, model 1 is the worst in adjusting the GCAPM for the CRP. This result is further confirmed by the CRP significance evidence, which does not discriminate between the emerging and developed countries. While digging into this phenomenon, we noticed that the higher is the illiquidity of a company, the lower is the GCAPM performance in explaining equity returns. Moreover, the higher is the GCAPM performance, the lower is the improvement obtained by adding the CRP to the GCAPM, using both model 2 or 3. The conclusion is that the higher is the illiquidity of a company, the higher should be the improvement obtained by adding the CRP to the GCAPM. We can assume that a company with few trading volumes is less known among international investors or is facing a distressed period which keeps the investor away from trading its stocks. We can assume that this company is likely to be less integrated with the global markets or more exposed to country-specific risks. If we take correlation as a proxy for measuring companies' integration and their exposure to country-specific risks, as we did in chapter 2, the conclusion reached would be consistent with the past literature with a small, but important, difference. The higher is the correlation between the company[49] and the market portfolio proxy, the more the company is integrated in the global markets and the less it's exposed to country-specific risks. This would imply that the higher is the correlation, the higher is the R^2 and Adjusted R^2 and the lower will be the enhancement in the GCAPM explanatory power by adjusting the model for the CRP (Figure 5.1). Hence, the companies' characteristics drive the GCAPM performance and not the markets' type. However, in the emerging markets is more likely to have companies less integrated with the global economy and with low trading volumes due to the low development of the

[49] Not the country.

country's capital markets. We would like to highlight some limitations of our research. Firstly, we have a small sample size, with only 88 observations per company. Secondly, the CRP estimates are available quarterly and we haven't been able to test model 3 with the SS measure, which would have been a good robust check to see if the SS and CDSS are exchangeable. In addition, the results obtained should be tested on other countries to check the consistency of our findings. Concluding, we want to highlight that the results presented are aggregate results of different companies, using medians and averages. There are several research questions opened by this study. The first one is why, if all the companies have been selected with the same screening method, only a small fraction exhibits significant CRP coefficients. Also, why the three CRP measures are close to each other in 43% of the countries. Another research question opened to further investigation is the CRP lag. It would be interesting to study which is the Lag that better reflects the return premium earned thanks to the country risk premium, if this lag changes from country to country and why. This study provides insights on how to improve the companies' cost of capital estimation in emerging and developed countries and how a trading strategy based on the country risk premium could be studied and tested. We trust the emerging markets to have opportunities that should be exploited, before the economic and financial integration neutralize any difference between emerging and developed markets. The sooner, the better.

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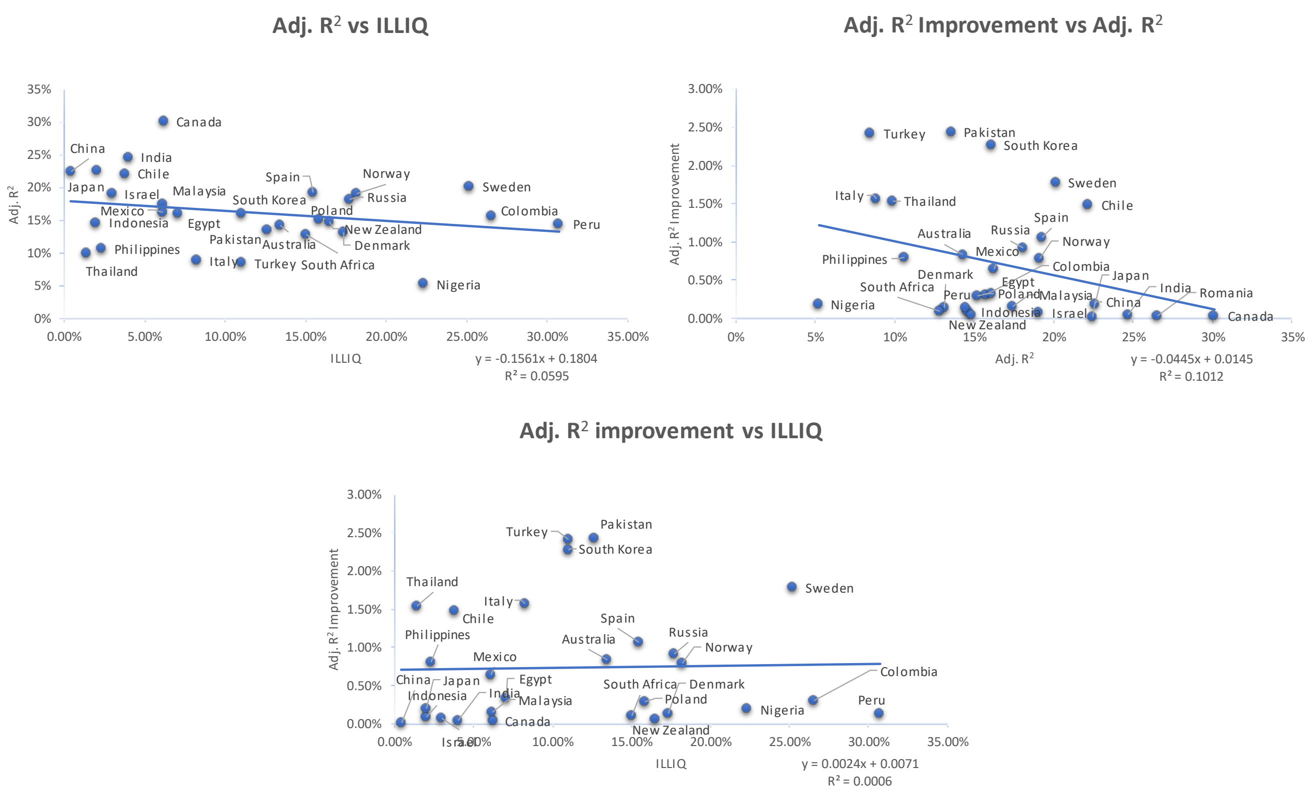
APPENDIX - FIGURES

FIGURE 5.1



(Please note that Brazil and Romania are excluded from the graphs as the fitted line would have been distorted by these two outliers.

APPENDIX – TABLES

TABLE 5.2

AUSTRALIA	Adj. Return	SMB	CRP SS	CRP CDSS	CRP RV
Mean	-0.67%	-0.08%	0.01%	0.03%	0.12%
Standard dev.	14.76%	9.43%	0.07%	0.02%	0.09%
Min	-39.66%	-23.77%	0.00%	0.00%	0.00%
1Q	-9.22%	-5.19%	0.00%	0.02%	0.05%
Median	-1.35%	-0.10%	0.00%	0.03%	0.10%
3Q	5.37%	5.23%	0.00%	0.04%	0.16%
Max	45.37%	33.93%	0.39%	0.08%	0.54%

COLOMBIA	Adj. Return	SMB	CRP SS	CRP CDSS	CRP RV
Mean	-0.96%	-0.64%	0.19%	0.12%	0.16%
Standard dev.	7.20%	6.71%	0.06%	0.04%	0.13%
Min	-27.15%	-30.56%	0.10%	0.07%	0.00%
1Q	-4.69%	-3.83%	0.15%	0.09%	0.06%
Median	-0.84%	-0.38%	0.18%	0.11%	0.11%
3Q	3.40%	3.18%	0.22%	0.14%	0.20%
Max	16.52%	20.39%	0.31%	0.24%	0.65%

BRAZIL	Adj. Return	SMB	CRP SS	CRP CDSS	CRP RV
Mean	-0.03%	-2.74%	0.22%	0.17%	0.23%
Standard dev.	9.15%	4.29%	0.10%	0.08%	0.19%
Min	-22.79%	-11.93%	0.08%	0.09%	0.00%
1Q	-5.75%	-5.86%	0.15%	0.12%	0.10%
Median	-0.03%	-2.80%	0.20%	0.14%	0.18%
3Q	5.93%	0.54%	0.28%	0.20%	0.28%
Max	27.98%	6.91%	0.48%	0.41%	0.89%

DENMARK	Adj. Return	SMB	CRP SS	CRP CDSS	CRP RV
Mean	0.98%	0.45%	0.00%	0.03%	0.09%
Standard dev.	5.67%	5.09%	0.03%	0.03%	0.07%
Min	-18.50%	-12.91%	0.00%	0.01%	0.00%
1Q	-2.35%	-2.67%	0.00%	0.02%	0.04%
Median	1.50%	0.07%	0.00%	0.02%	0.07%
3Q	4.89%	3.66%	0.00%	0.03%	0.12%
Max	15.52%	16.32%	0.15%	0.12%	0.43%

CANADA	Adj. Return	SMB	CRP SS	CRP CDSS	CRP RV
Mean	-0.20%	-2.51%	0.00%	0.04%	0.06%
Standard dev.	5.62%	6.99%	0.02%	0.01%	0.06%
Min	-17.33%	-20.45%	0.00%	0.02%	0.00%
1Q	-3.56%	-6.63%	0.00%	0.04%	0.03%
Median	0.35%	-2.63%	0.00%	0.04%	0.05%
3Q	3.65%	1.64%	0.00%	0.05%	0.10%
Max	15.22%	15.19%	0.11%	0.08%	0.43%

EGYPT	Adj. Return	SMB	CRP SS	CRP CDSS	CRP RV
Mean	-0.65%	-1.05%	0.39%	0.37%	0.23%
Standard dev.	9.96%	6.30%	0.08%	0.11%	0.17%
Min	-31.50%	-16.12%	0.13%	0.21%	0.00%
1Q	-7.28%	-5.26%	0.35%	0.28%	0.10%
Median	-0.58%	-1.60%	0.38%	0.34%	0.19%
3Q	5.37%	3.16%	0.43%	0.43%	0.30%
Max	28.63%	13.14%	0.55%	0.73%	0.80%

CHILE	Adj. Return	SMB	CRP SS	CRP CDSS	CRP RV
Mean	-0.33%	-2.62%	0.09%	0.07%	0.10%
Standard dev.	6.76%	7.62%	0.03%	0.02%	0.08%
Min	-19.05%	-34.81%	0.00%	0.03%	0.00%
1Q	-4.62%	-6.65%	0.08%	0.06%	0.05%
Median	-0.63%	-2.59%	0.09%	0.07%	0.08%
3Q	3.52%	1.53%	0.10%	0.08%	0.13%
Max	16.63%	14.50%	0.14%	0.13%	0.36%

INDIA	Adj. Return	SMB	CRP SS	CRP CDSS	CRP RV
Mean	0.01%	-1.14%	0.18%	0.08%	0.17%
Standard dev.	10.36%	6.67%	0.04%	0.07%	0.14%
Min	-28.01%	-14.96%	0.10%	0.00%	0.00%
1Q	-6.33%	-5.14%	0.15%	0.00%	0.07%
Median	0.11%	-2.20%	0.17%	0.07%	0.14%
3Q	6.34%	3.12%	0.19%	0.13%	0.24%
Max	27.22%	19.20%	0.28%	0.26%	0.94%

CHINA	Adj. Return	SMB	CRP SS	CRP CDSS	CRP RV
Mean	0.37%	-3.06%	0.08%	0.08%	0.13%
Standard dev.	10.83%	8.43%	0.03%	0.02%	0.11%
Min	-35.54%	-30.48%	0.00%	0.00%	0.00%
1Q	-5.37%	-8.18%	0.07%	0.06%	0.05%
Median	0.18%	-2.94%	0.08%	0.07%	0.10%
3Q	5.95%	2.04%	0.08%	0.09%	0.18%
Max	36.28%	18.11%	0.14%	0.16%	0.76%

INDONESIA	Adj. Return	SMB	CRP SS	CRP CDSS	CRP RV
Mean	-0.03%	1.05%	0.18%	0.13%	0.17%
Standard dev.	10.13%	5.40%	0.04%	0.05%	0.14%
Min	-24.30%	-10.55%	0.11%	0.00%	0.00%
1Q	-6.55%	-3.01%	0.14%	0.11%	0.07%
Median	-0.20%	1.16%	0.18%	0.13%	0.14%
3Q	5.77%	5.21%	0.20%	0.16%	0.24%
Max	27.83%	11.81%	0.26%	0.24%	1.00%

(Companies' data aggregated using the mean)

TABLE 5.3

Variance Inflation Factors									
	MSCI	SMB	CRP SS	MSCI	SMB	CRP CDSS	MSCI	SMB	CRP RV
Australia	1.031	1.105	1.124	1.044	1.013	1.035	1.012	1.016	1.009
Brazil	1.002	1.004	1.002	1.004	1.002	1.002	1.004	1.002	1.002
Canada	1.095	1.066	1.031	1.073	1.066	1.017	1.074	1.064	1.013
Chile	1.032	1.089	1.057	1.050	1.049	1.030	1.031	1.034	1.002
China	1.012	1.049	1.037	1.034	1.029	1.035	1.025	1.012	1.013
Colombia	1.019	1.009	1.020	1.013	1.009	1.013	1.006	1.010	1.007
Denmark	1.032	1.004	1.029	1.022	1.007	1.022	1.005	1.004	1.001
Egypt	1.014	1.014	1.001	1.030	1.024	1.023	1.015	1.014	1.001
India	1.045	1.048	1.024	1.043	1.051	1.024	1.040	1.033	1.009
Indonesia	1.006	1.014	1.008	1.011	1.011	1.011	1.015	1.008	1.011
Israel	1.166	1.136	1.031	1.146	1.133	1.022	1.132	1.131	1.001
Italy	1.020	1.009	1.026	1.012	1.015	1.025	1.002	1.004	1.002
Japan	1.086	1.147	1.114	1.072	1.121	1.062	1.070	1.069	1.001
Malaysia	1.026	1.015	1.011	1.020	1.024	1.013	1.016	1.024	1.009
Mexico	1.005	1.028	1.030	1.026	1.005	1.028	1.006	1.020	1.023
New Zealand	1.004	1.005	1.005	1.017	1.013	1.028	1.002	1.008	1.007
Nigeria	1.036	1.036	1.017	1.031	1.040	1.011	1.035	1.036	1.014
Norway	NA	NA	NA	1.034	1.035	1.035	1.011	1.004	1.010
Pakistan	1.027	1.010	1.031	1.012	1.004	1.008	1.016	1.006	1.014
Peru	1.018	1.014	1.011	1.020	1.043	1.038	1.019	1.011	1.008
Philippines	1.009	1.076	1.081	1.011	1.066	1.072	1.007	1.028	1.026
Poland	1.010	1.035	1.039	1.016	1.039	1.049	1.011	1.006	1.009
Romania	1.048	1.056	1.037	1.045	1.077	1.056	1.049	1.037	1.013
Russia	1.024	1.095	1.070	1.039	1.067	1.052	1.039	1.067	1.052
South Africa	1.113	1.135	1.046	1.128	1.149	1.066	1.094	1.125	1.030
South Korea	1.014	1.008	1.007	1.021	1.036	1.039	1.018	1.011	1.013
Spain	1.113	1.135	1.046	1.128	1.149	1.066	1.094	1.125	1.030
Sweden	NA	NA	NA	1.021	1.002	1.022	1.007	1.005	1.011
Thailand	1.013	1.027	1.039	1.012	1.018	1.030	1.006	1.000	1.006
Turkey	1.057	1.055	1.002	1.067	1.070	1.021	1.060	1.055	1.005

(Companies' data aggregated using the mean)

TABLE 5.4 (Companies' data aggregated using the median)

AUSTRALIA																										
	MODEL 1									MODEL 2									MODEL 3							
CRP estimates	Sovereign Spread			CDS Spread			Relative Volatility			Sovereign Spread			CDS Spread			Relative Volatility			CDS Spread				Relative Volatility			
Coefficients	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	λ	α	β	SMB	λ
Median	-0.01	0.46	0.37**	-0.01	0.46	0.37**	-0.01	0.46	0.37**	-0.01	0.47	0.37**	-0.01	0.46	0.37**	-0.01	0.46	0.37**	0.00	0.54	0.31**	-0.06	-0.02	0.47	0.36*	0.31
Standard Error	0.02	0.46	0.18	0.02	0.46	0.18	0.02	0.46	0.18	0.02	0.46	0.18	0.02	0.46	0.18	0.02	0.46	0.18	0.02	0.67	0.21	0.14	0.02	0.46	0.17	1.35
t Value	-0.99	1.56	2.40	-1.01	1.57	2.42	-1.08	1.57	2.42	-0.98	1.56	2.41	-0.99	1.56	2.42	-1.04	1.58	2.42	-0.93	1.32	2.36	-0.58	-0.92	1.56	2.34	0.32
Pr(>|t|)	0.20	0.12	0.05	0.19	0.12	0.05	0.17	0.12	0.05	0.20	0.12	0.05	0.20	0.12	0.05	0.18	0.12	0.05	0.25	0.20	0.02	0.56	0.17	0.13	0.06	0.34

BRAZIL																										
	MODEL 1									MODEL 2									MODEL 3							
CRP estimates	Sovereign Spread			CDS Spread			Relative Volatility			Sovereign Spread			CDS Spread			Relative Volatility			CDS Spread				Relative Volatility			
Coefficients	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	λ	α	β	SMB	λ
Median	-0.01	0.9***	-0.21	-0.01	0.9***	-0.21	-0.01	0.89***	-0.21	-0.01	0.9***	-0.21	-0.01	0.9***	-0.21	-0.01	0.91***	-0.21	-0.01	0.9***	-0.2	-0.06	-0.03*	0.89***	-0.22	0.74*
Standard Error	0.01	0.31	0.23	0.01	0.31	0.23	0.01	0.31	0.23	0.01	0.31	0.23	0.01	0.31	0.23	0.01	0.31	0.23	0.01	0.31	0.23	0.07	0.02	0.30	0.23	0.42
t Value	-0.94	3.04	-0.97	-0.90	3.03	-0.96	-0.95	3.04	-0.97	-0.95	3.07	-0.97	-0.90	3.04	-0.96	-0.97	3.19	-0.96	-0.66	3.05	-0.84	-0.93	-2.01	3.02	-0.99	1.95
Pr(>|t|)	0.34	0.00	0.23	0.36	0.00	0.23	0.33	0.00	0.22	0.33	0.00	0.23	0.36	0.00	0.23	0.32	0.00	0.23	0.44	0.00	0.28	0.36	0.05	0.00	0.20	0.06

CANADA																										
	MODEL 1									MODEL 2									MODEL 3							
CRP estimates	Sovereign Spread			CDS Spread			Relative Volatility			Sovereign Spread			CDS Spread			Relative Volatility			CDS Spread				Relative Volatility			
Coefficients	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	λ	α	β	SMB	λ
Median	0	0.54***	0.24***	0	0.54***	0.24***	0	0.54***	0.24***	0	0.54***	0.24***	0	0.54***	0.24***	0	0.54***	0.24***	0	0.54***	0.24***	0.02	0	0.53***	0.24***	0.16
Standard Error	0.01	0.18	0.08	0.01	0.18	0.08	0.01	0.18	0.08	0.01	0.18	0.08	0.01	0.18	0.08	0.01	0.18	0.08	0.01	0.18	0.08	0.04	0.01	0.18	0.08	0.83
t Value	0.68	3.72	3.38	0.58	3.73	3.37	0.53	3.72	3.37	0.69	3.73	3.38	0.63	3.72	3.37	0.60	3.72	3.37	0.67	3.70	3.39	0.64	0.07	3.67	3.37	0.30
Pr(>|t|)	0.19	0.00	0.00	0.20	0.00	0.00	0.22	0.00	0.00	0.19	0.00	0.00	0.18	0.00	0.00	0.18	0.00	0.00	0.20	0.00	0.00	0.47	0.46	0.00	0.00	0.65

CHILE																										
	MODEL 1									MODEL 2									MODEL 3							
CRP estimates	Sovereign Spread			CDS Spread			Relative Volatility			Sovereign Spread			CDS Spread			Relative Volatility			CDS Spread				Relative Volatility			
Coefficients	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	λ	α	β	SMB	λ
Median	0	0.7***	0.26***	0	0.7***	0.26***	0	0.7***	0.26***	0	0.7***	0.26***	0	0.7***	0.26***	0	0.71***	0.26***	0	0.72***	0.26***	-0.06	-0.01	0.7***	0.25**	0.51
Standard Error	0.01	0.20	0.09	0.01	0.20	0.09	0.01	0.20	0.09	0.01	0.20	0.09	0.01	0.20	0.09	0.01	0.20	0.09	0.01	0.20	0.10	0.05	0.01	0.20	0.09	0.63
t Value	-0.39	3.61	2.69	-0.36	3.61	2.69	-0.42	3.63	2.69	-0.33	3.60	2.69	-0.31	3.62	2.69	-0.35	3.65	2.70	-0.37	3.63	2.76	-1.45	-0.70	3.62	2.65	0.88
Pr(>|t|)	0.45	0.00	0.01	0.48	0.00	0.01	0.45	0.00	0.01	0.51	0.00	0.01	0.52	0.00	0.01	0.50	0.00	0.01	0.51	0.00	0.01	0.15	0.49	0.00	0.01	0.38

CHINA																										
	MODEL 1									MODEL 2									MODEL 3							
CRP estimates	Sovereign Spread			CDS Spread			Relative Volatility			Sovereign Spread			CDS Spread			Relative Volatility			CDS Spread				Relative Volatility			
Coefficients	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	λ	α	β	SMB	λ
Median	0.02*	0.46	0.46***	0.02*	0.46	0.46***	0.02*	0.45	0.46***	0.02**	0.46	0.46***	0.02**	0.46	0.46***	0.02**	0.46	0.46***	0.02**	0.47	0.46***	-0.01	0.01	0.45	0.46***	0.08
Standard Error	0.01	0.31	0.12	0.01	0.31	0.12	0.01	0.31	0.12	0.01	0.31	0.12	0.01	0.31	0.12	0.01	0.31	0.12	0.01	0.31	0.12	0.07	0.02	0.31	0.12	0.73
t Value	1.43	1.61	3.43	1.43	1.60	3.43	1.39	1.59	3.43	1.47	1.61	3.43	1.47	1.61	3.42	1.46	1.61	3.42	1.59	1.63	3.42	-0.10	0.89	1.57	3.40	0.13
Pr(>|t|)	0.05	0.11	0.00	0.05	0.12	0.00	0.06	0.12	0.00	0.05	0.11	0.00	0.05	0.11	0.00	0.05	0.11	0.00	0.04	0.11	0.00	0.81	0.25	0.12	0.00	0.73

COLOMBIA																										
	MODEL 1									MODEL 2									MODEL 3							
CRP estimates	Sovereign Spread			CDS Spread			Relative Volatility			Sovereign Spread			CDS Spread			Relative Volatility			CDS Spread				Relative Volatility			
Coefficients	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	α	β	SMB	λ	α	β	SMB	λ
Median	-0.02*	0.63**	0.02**	-0.01*	0.63**	0.02**	-0.01*	0.63**	0.02**	-0.01*	0.64***	0.02**	-0.01*	0.63***	0.02**	-0.01*	0.63***	0.02**	-0.01	0.63**	0.02**	-0.02	-0.01	0.63**	0.02**	0.07
Standard Error	0.01	0.23	0.11	0.01	0.23	0.11	0.01	0.23	0.11	0.01	0.23	0.11	0.01	0.23	0.11	0.01	0.23	0.11	0.01	0.23	0.11	0.05	0.01	0.23	0.11	0.46
t Value	-1.80	2.66	0.18	-1.70	2.66	0.18	-1.75	2.65	0.19	-1.77	2.71	0.18	-1.70	2.69	0.18	-1.74	2.66	0.18	-1.57	2.66	0.18	-0.42	-1.06	2.64	0.16	0.15
Pr(>|t|)	0.08	0.01	0.01	0.09	0.01	0.01	0.08	0.01	0.01	0.08	0.01	0.01	0.10	0.01	0.01	0.09	0.01	0.01	0.12	0.01	0.01	0.68	0.30	0.01	0.01	0.77