Biblioteca digital
de la Universidad Catolica Argentina

Grandes, Martín ; Panigo, Demian T. ; Pasquini, Ricardo A.

On the estimation of the cost of equity in Latin America

Documento de Trabajo Nº 1
Facultad de Ciencias Económicas. Escuela de Negocios

Este documento está disponible en la Biblioteca Digital de la Universidad Católica Argentina, repositorio institucional desarrollado por la Biblioteca Central "San Benito Abad". Su objetivo es difundir y preservar la producción intelectual de la institución.
La Biblioteca posee la autorización del autor para su divulgación en línea.

Cómo citar el documento:

Grandes, M., Panigo, D. T., Pasquini, R. A. (2010). On the estimation of the cost of equity in Latin America [en línea] (Documento de trabajo No. 1 de la Escuela de Negocios de la Facultad de Ciencias Económicas de la Universidad Católica Argentina). Disponible en: http://bibliotecadigital.uca.edu.ar/repositorio/estimation-cost-equity-latin-america.pdf

(Se recomienda indicar fecha de consulta al final de la cita. Ej: [Fecha de consulta: 19 de agosto de 2010]).

Pontificia Universidad Católica Argentina

Santa María de los Buenos Aires

Escuela de Negocios

Documento de Trabajo Nro. 1

On the Estimation of the Cost of Equity in Latin America

Martín Grandes

Demian T. Panigo

Ricardo A. Pasquini

On the Estimation of the Cost of Equity in Latin America

Martín Grandes[1]
Pontifical Catholic University of Argentina and University of Buenos Aires

Demian T. Panigo
Center of Labor Research of the National Council of Scientific and Technical Research and National University of La Plata (UNLP)

Ricardo A. Pasquini
Torcuato Di Tella University

Abstract

This paper researches the sources of stock market risk influencing the pricing of 921 Latin American stocks and computes their corresponding opportunity cost (COE) over the period 1993-2004 by firm and sector. Running an adjusted version of the Capital Asset Pricing Model (CAPM) it finds that systematic risk accounts on average for more than 32% of the variability in COE. A robustness test for the omission of international sources of undiversifiable risk suggests that both global market and real currencies portfolios do not add significant information to domestic market portfolios. Moreover, a second robustness check offers further evidence that well-diversified portfolios constructed by sorting stocks according to their size and book-to-market ratios *a la* Fama and French do not improve the goodness of fit in the regressions based on the adjusted version of CAPM.

JEL codes: G12, G15.

Keywords: COST OF EQUITY – LATIN AMERICA – CAPM – INTERNATIONAL CAPM – THREE FACTOR MODEL.

---

[1]Corresponding author email: martin_grandes@uca.edu.ar. We are grateful to the Swiss Agency for Development and Cooperation for generous financial support to the project which gave rise to this paper and that was conducted at the Center for Financial Stability (CEF).

Contents

I. Introduction

This paper offers new empirical evidence on the sources of risk that determine the opportunity cost of equity capital (henceforth COE) in emerging markets, using seven Latin American stock markets as a case study. We pick the seven largest markets by capitalization, namely Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela spanning monthly observations for the period 1993-2004. Building on stock price data from 921 publicly listed firms we are able to design and test a robust time-series econometric methodology to estimate COE across countries, sectors and firms.

Taking as starting point an adjusted version of the Capital Asset Pricing Model (CAPM, Sharpe, 1964, Lintner, 1964), we first investigate how much of COE variability can be attributed to systematic (i.e., undiversfiable) risk. We find that for Latin America as a whole, nearly a third of COE variability on average can be attributed to systematic sources of risk. In a second step, we check the robustness of these results to the inclusion of global stock and real currency portfolios (global factors in what follows). In other words, should internationally well-diversified portfolios be factored in the pricing of Latin American stocks? In fact, as Latin American countries opened up its capital markets to foreign investors and let its residents invest abroad, the question of how much of the stock risk that Latin American firms bear is correlated with global risk factors has increasingly gained ground in the research agenda. Our results suggest that global factors do not add explanatory power to domestic portfolios in the adjusted CAPM regressions, which may signal that a significant fraction of regional stock market risk is indeed correlated with global risk and hence that local market portfolios are already capturing the relevant sources of global risk.

In a third and last step, we test for the presence of other sources of common risk originated in the size –small firms are required a higher return than larger firms- and book-to market value of stocks that pervade in stock returns and that domestic market portfolios fail to price in according to the Fama-French Three Factor Model (FF3FM, Fama and French 1992, 1993, 1996 and 1998). We conclude that: 1) both size and value premia are not generally statistically significant risk factors, and 2) they do not add informational power to the domestic market portfolio in the explanation of stock (excess) returns.

The study makes a contribution to the empirical literature on stock pricing and corporate valuation in emerging markets (see Godfrey, S., and R. Espinosa, 1996, Rouwenhorst 1999, Wong 2000, Fama and French 1998 and 2004, Bonomo and Garcia, 2001, Bruner et al, 2002, Mishra and O´Brien, 2005, Pereiro 2006, Gozzi, Levine, and Schmukler, 2008, Iqbal et al, 2009 or Barclay et al, 2010 among others) in at least 3 ways: 1) it sets out and econometrically runs a modified version of CAPM to allow for the instability in the estimation of betas, the presence of sovereign risk as government risk-free rates in most of these countries are not default risk-free, illiquidity and the stochastic nature of risk-free interest rates, 2) it provides two robustness tests to check whether well diversified global and multilateral currency portfolios on the one hand, and portfolios constructed according to the stock size and book-to-market ratios, add information to the adjusted version of CAPM on the other, and 3) it informs business and financial managers on how (or how not) to value stocks in a large and representative sample of emerging Latin American markets.

The remainder of the paper is organized as follows. Section 2 presents the baseline theoretical framework, which is an adjusted version of CAPM, the data, and the econometric estimates of COE across markets, sectors and firms. In the same section we calculate and compare two measures of the share of systematic risk in COE. Section 3 provides 2 robustness tests for the inclusion of additional sources of global factors and common risk not allowed for in CAPM. Section 4 summarizes the results and concludes.

II. COE estimation and the role of systematic risk

II. 1. Starting Point: Adjusting the standard CAPM

In this section we present an adjusted version of the Capital Asset Pricing Model (CAPM) that takes into account the likely instability of the estimated beta parameters (or systematic risk factor loading), the choice of the risk-free rate under sovereign default risk, the stochastic nature of interest rates and the low frequency trading in emerging stock markets, i.e. illiquidity.

We start from the CAPM version of Sharpe (1964) Lintner (1965). The pricing relation implied by this model yields the opportunity COE, defined as the expected return of an asset (stock) i. Equation (1) illustrates the CAPM pricing relationship:

(1)

$$E(R_i) - R_f = \beta_{iM} \left[E(R_M) - R_f \right] \qquad \forall\, i = 1,\ldots,N$$

where $E(R_i)$ is the expected return of asset *i*, R_f is the risk-free interest rate, $(E(R_M) - R_f)$ is the domestic market risk premium (or domestic market excess return) and β_{iM} is the individual excess return sensitivity to domestic market risk or the systematic risk factor loading.

Since it is assumed that investors are able to fully diversify their portfolios, all individual risk is assumed to be diversified away so the expected return of an asset i is only determined by the sensitivity to systematic risk, captured by the multiple of beta and the excess return on the market portfolio.

Before presenting our data and estimating equation (1) several issues need to be addressed. A first issue concerns the rate which should be used as a risk-free interest rate. While in developed markets the yield on a government bond may be a good proxy for a risk-free rate, in most Latin American markets government/sovereign bond yields do not come without default risk, therefore a spread should be added to the pure risk-free rate. Moreover, sovereign default risk is typically a significant determinant of corporate default risk[2], and hence accounts for part of the non-diversifiable risk prevailing in those markets. As a result, we proceed to incorporate sovereign default risk into the COE pricing equation, assuming this risk is actually priced in the assets composing the local market portfolio, as follows:

(2)

$$COE_{i,t} = R_{f,t} + \beta_i^b \left[R_{M,t} - R_{f,t} - SS_{j,t}\right] + SS_{j,t}$$

where $R_{f,t}$ is the US Treasury Bond yield, $SS_{j,t}$ is the sovereign spread of country j at time t, ($R_{M,t} - R_{f,t} - SS_{j,t}$) is the sovereign spread-adjusted market excess return, and β_i^b is the asset i excess return sensitivity to the sovereign spread-adjusted market excess return.

A second issue pertains to the choice of the proxy for the theoretical local market portfolio and whether global factors should be incorporated into it. Theoretically, the chosen proxy should completely capture the un-diversifiable risk prevailing in the market. A reasonable choice might be to use a local market index tracking the most representative stocks in terms of trading and capitalization.

A third issue is the observed volatility in interest rates $R_{f,t}$ and the potential instability of the beta estimates. In this regard, our econometric strategy is to estimate an adjusted version of

[2]See for instance Durbin and Ng (2005). The reader should note that as of the time of writing this article only Chile and

Equation (2) following Black`s (1972) approach to interest rate volatility [3] using monthly stock return observations, a four-year rolling window sample to control for beta instability[4] (i.e. we estimate moving betas) and the unconditional Generalized Method of Moments (GMM) estimator. We favour GMM against OLS estimators because as it has been documented in the literature which studies the behavior of financial assets returns (see for instance Bonomo and Garcia, 2001, who also use GMM) the OLS estimator suffers from several shortcomings: it has a mean reversion tendency, it is inefficient when returns (or excess returns) distributions are abnormal, and also introduces significant biases when stocks are poorly and thinly traded (illiquidity) . On the contrary, the GMM estimator does not rely on the normality, homoskedasticity, and the lack of serial correlation assumptions under OLS. Indeed, GMM estimators can afford distribution of returns which are heteroskedastic, serially dependent and non-Gaussian. The only required assumption is that returns are stationary with finite fourth moments (see Ferson and Jagannathan, 1996, and Fernandes, 2004) [5]

A fourth issue has to do with the presence of infrequent and low volume trading in the sample that may bias our estimations. To avoid the loss of observations that would result if we

Mexico´s government bonds were rated in the investment grade category.

[3]We use Black's (1972) estimation procedure which allows for interest rate variability within the sample period considered, a useful feature in markets that display significant interest rate volatility This is: $Ex_{i,t} = \beta_i^b \left[R_{M,t} - R_{f,t} - SS_{j,t}\right] + v_{i,t}$; Where $Ex_{i,t}$ stands for "asset excess return", namely: $Ex_{i,t} = R_{i,t} - R_{f,t} + SS_{j,t}$.

[4]Taking into account a potential trade-off between efficiency and the likelihood of structural breaks (i..e. parameter instability), Altman, Jacquillet, and Levasseur (1974), Roenfeldt, Griepentrog, and Pflaun (1978), Smith (1980), and Daves, Ehrhardt and Kunkel (2000) conclude that the optimal estimation period ranges from four to nine years. A four year sample is consistent with the average length of the business cycle in the largest Latin American countries (see Carrera, Féliz and Panigo, 1998).

[5] Latin American stock market returns have very small first order autocorrelation coefficients and none of them appear to be close to the unit root (for lack of space we do not report these results here). The results of the Augmented Dickey-Fuller (ADF) tests (without structural breaks in order to allow for a higher probability of non rejection of the unit root hypothesis) do not support the null hypothesis of the existence of a unit root. Indeed, 90 to 95 per cent of these results (depending on whether we use 12 or 4 lags in the ADF test) reject the null hypothesis as GMM assumptions prescribe. Lastly, given the lack of a widely-accepted underlying theory supporting a conditional GMM equation (a GMM equation with instrumental variables for local market excess returns), we use the unconditional equation yielding GMM estimators that are the same as the OLS estimators. Nevertheless, GMM regressions yield heteroskedasticity and serial correlation consistent standard deviations, which is particularly important for specification purposes.

reduced the sample frequency, we use a weighting matrix in our regressions to correct for low trading observations[6] . The matrix weights are the number of monthly traded shares. In this way, high traded volume drive beta estimates. Finally, to address the potentially high variability of beta estimates we adopt the adjustment procedure put forward by Vasicek (1973)[7] and apply it to our 4-year estimated rolling betas. Individual stock illiquidity, changes in the market indexes (owing to delisting, mergers & acquisitions, etc.) and macroeconomic uncertainty are possible factors sparking highly volatile CAPM beta estimates. Basically, the Vasicek`s estimator preserves the mean reversion property while taking into account the dispersion in rolling individual betas and across sectors[8].

Summing up, we modify the standard CAPM in order to make it suitable for emerging stock market data by dealing altogether with multiple biases caused by illiquidity, potential instability in the beta parameter estimates and highly volatile interest rates in economic environments where risk-free rates are not risk-free. Assuming that the individual premium on systematic risk already prices in the extra premium due to sovereign risk (i.e., in the case that

---

[6]This is equivalent to assume that investors form expectations using a simple and single rule: factor loadings on systematic risk (beta parameters) are better represented by high-trading observations. If we equally weighed high and low-trading (including non-trading) observations we would introduce noise in the beta expectation formation because we would have a higher probability of hazardous returns in low-trading days.

[8]When the standard deviation of the estimate of the individual beta is high compared to the standard deviation of the average beta estimate, the beta forecast tends to converge to the average beta (e.g. average beta by sector). Conversely, when the standard deviation of the estimate of the individual beta is small compared to the standard deviation in the estimate of the average beta, then the beta forecast tends to converge towards the individual beta. Formally, Vasicek's (1973) adjusted beta is a weighted average between the individual and sector betas where beta standard deviations (the measure of the uncertainty about betas) are the weights:
(4)

$$\beta_i^{VA} = \beta_i \left(\frac{\sigma_{\beta_s}}{\sigma_{\beta_s} + \sigma_{\beta_i}} \right) + \beta_s \left(\frac{\sigma_{\beta_i}}{\sigma_{\beta_s} + \sigma_{\beta_i}} \right) ;$$

where β_i^{VA} is the firm i 's Vasicek's adjusted beta, β_i is the firm i 's CAPM standard beta, β_s is the sector s 's across-firm average beta (with firm i belonging to sector s), $\sigma_{\beta i}$ is the firm i's standard deviation of beta estimate and σ_{β_s} is sectors across-firm standard deviation of betas.

the sovereign premium is incorporated as part of the excess market portfolio return), the unbiased COE estimation can be performed through the following equation:

(3)

$$COE_{i,t} = R_{f,t} + \beta_i^{va}\left[R_{M,t} - R_{f,t} - SS_{j,t}\right] + SS_{j,t}$$

where $SS_{j,t}$ is the local government yield in excess of the corresponding US Treasury bond rate, or sovereign spread.[9] Equation (3) is the adjusted version of the CAPM equation we adopt to obtain the empirical results reported hereinafter.

II. 2. Data

Our dataset covers 921 publicly traded firms from the 7 largest Latin American stock markets: Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. The main source is *Economatica*. Although the full sample spans the period 1986-2004 we limit the analysis to a restricted sample from 1993 to 2004[10] in order to get comparable figures. However, as the econometric models are run on the basis of 48-month moving windows our COE estimates start in 1997 using information since 1993. All data are expressed in current US dollars.

Table I presents summary statistics about the seven stock markets. Column I displays the absolute number of firms (stocks) per country reported by *Economatica* and Column II

[9] Since major financial institutions provide widely accepted data on emerging markets sovereign spreads in hard currency - typically in the form of bond spreads or total returns indexes, most practitioners make use of it in order to estimate modified domestic CAPM betas. However, this data has been only recently available in some Latin American countries for two reasons. First, secondary government bond markets for long maturities were nearly inexistent before the Brady Plans. Second, comprehensive indexes are only available since 1993 (e.g. JP Morgan EMBI+). Moreover, some Latin American countries like Chile had not had benchmark government bonds in hard currency until 1998. Given the constraint on sovereign spread data availability, we proceed to complete the actual dataset, namely JP Morgan EMBI+ indexes for Argentina, Brazil, Colombia, Mexico, Peru and Venezuela and JP Morgan EMBI Global indexes for Chile, with parametric estimations based on Druck and Morón's (2001) single equation model.

indicates the percentage share of these firms in the total number of companies listed in each stock market at the end of 2004 according to the World Federation of Stock Exchanges. Chile is the country with the highest number of publicly traded stocks in the sample (88% of the listed firms) followed by Brazil (79%, but the highest absolute number of firms per country, accounting for a third of the total number of stocks), whereas Colombia posts the lowest share of listed firms covered by *Economatica* (44%). Columns 3 and 4 exhibit the mean and standard deviation of monthly-average stock returns. We observe some significant variation in mean returns and standard deviations across stock markets.

The last two columns provide estimates of the median firm market capitalization (size) and concentration.[11] In Column 5, we evidence a sizeable variability in median market capitalizations across countries. For instance, the Peruvian and Venezuelan median firms exhibit about one tenth and two tenths respectively the size of the Mexican median firm, the largest in the sample. This fact suggests that in spite of the restricted number of listed firms in each stock market, if there is any cross-sectional variation in returns associated with size we should be able to capture it. Column 6 shows a measure of market concentration, defined as the share of the equity market capitalization accumulated by the 5 largest firms. The less concentrated market is Chile (27.7%), followed by Brazil (30%).

[11]We report median instead of average values because of the huge variability across firms within each stock market. For example, the ratio between the mean market capitalizations of the 10 largest and the 10 smallest firms is 536 in Argentina, 767 in Chile, and 4818 in Brazil (these figures are not reported in the table).

Table I: Latin American Stock Markets-Summary Statistics: 1997-2004

All statistics except for those in columns 1 and 2 are computed using monthly average observations per firm/market over the period 1997-2004. As the starting date in the sample differs across countries, e.g. it is 1986 in the case of Brazil and 1993 for Colombia, we restrict the sample to the period 1997-2004 (using information since 1993) in order to work with comparable figures. This yields 96 monthly observations per firm/country.
Columns 3 and 4 are based on a value-weighted portfolio return. The value weighted portfolio return weighs each stock return by its respective market capitalization as a percentage of the total market capitalization. The table reports the time-series means and standard deviation.

	Sample Coverage		Stock returns		Stock Valuation	
	Number of firms in the sample	Coverage rate (%)	Mean (%)	Standard Deviation (%)	Median Market Capitalization (in millions of USD)	Market Concentration (%)
Argentina	81	74	23.9	56.4	80.6	61.4
Brazil	307	79	40.0	74.0	106	30.6
Chile	211	88	15.0	32.5	103	27.7
Colombia	47	44	17.1	38.2	179	41.9
Mexico	120	51	21.2	42.1	271	39.6
Peru	115	51	17.4	32.1	34.3	48.8
Venezuela	40	74	33.8	88.2	59.8	71.3

Source: Authors own calculations based on *Economatica*.

II. 3. Estimates

In this section we present and discuss the COE estimates across countries and across 21 economic sectors following the *Economatica* classification.

For each country and sector, Table II reports the volume-weighed average COE across firms.[12] Average COE estimates appear to be relatively high on an absolute basis reaching an average level of 30%.[13]. However, this finding should not come as a surprise because our sample period covers several Latin American financial crisis episodes.[14]

[12]We use traded volume (in US current dollars) instead of market capitalization as across-firm weighting variable (e.g. to obtain weighted average COE estimates by sector or country). Big firms with high market capitalization but low trading activity (low volume) must be highly weighted when stock variables are taken into account but only high volume firms (irrespective of whether they are big or small in terms of market capitalization) should be highly weighted when flow variables are analyzed. Because COE estimates are obtained from a flow of traded shares, volume weights improve both its sector and country average reliability.

[13]It is worth noting that negative COE estimates were set to 0, what increases the latter by 25% on average. While for developed countries, negative COE estimates are rare; in emerging markets this pattern may be common during protracted crises periods where a persistent negative market premium is observed. In general, the empirical literature has dealt with negative COE estimates using a trimming rule that sets to 0 all negative COE estimates (see for example Hail and Leuz ,2004, or Barnes and Lopez, 2005).

[14]These are the Mexian crisis (1994-1995), the Brazilian crisis (1999), and the Argentine crisis of 2001-2002.

Table II: COE Estimates, by Country and Sector: 1997-2004

For each firm in the sample we estimate the COE based upon the adjusted version of CAPM stated in equation (3) in section I. For each country and sector, the first row reports the volume-weighed average COE estimation. The second row displays its standard deviation (in parentheses).

Sector	Argentina	Brazil	Chile	Colombia	Mexico	Peru	Venezuela	Latin America
Agriculture & Fishing	0.19	0.37	0.17		0.23	0.18	0.09	0.22
	(0.26)	(0.28)	(0.17)		(0.24)	(0.21)	(0.11)	(0.24)
Chemicals & Chemical Products	0.24	0.28	0.09	0.21	0.22	0.15	0.25	0.27
	(0.38)	(0.34)	(0.12)	(0.21)	(0.23)	(0.29)	(0.51)	(0.35)
Construction	0.27	0.15	0.15		0.29	0.66		0.29
	(0.41)	(0.17)	(0.16)		(0.30)	(0.67)		(0.30)
Electrical Equipment & Electronic Products	0.26	0.27	0.27			0.29		0.27
	(0.27)	(0.37)	(0.29)			(0.53)		(0.37)
Electricity	0.29	0.31	0.16	0.38		0.10	0.58	0.29
	(0.43)	(0.48)	(0.24)	(0.37)		(0.09)	1.03	(0.49)
Finance & Insurance	0.36	0.24	0.13	0.27	0.31	0.16	0.25	0.28
	(0.63)	(0.35)	(0.17)	(0.37)	(0.45)	(0.25)	(0.55)	(0.44)
Food & Beverages	0.29	0.21	0.22	0.35	0.26	0.22	0.15	0.25
	(0.43)	(0.26)	(0.21)	(0.47)	(0.32)	(0.38)	(0.08)	(0.32)
Machinery & Equipment	0.20	0.21			0.28	0.14		0.26
	0.21	0.24			(0.34)	(0.17)		(0.31)
Mining		0.19	0.23	0.29	0.22	0.25	0.14	0.21
		(0.21)	(0.24)	(0.35)	(0.21)	(0.42)	0.11	(0.24)
Motor Vehicles& Related	0.31	0.24			0.17			0.25
	(0.66)	(0.23)			(0.23)			(0.30)
Non-Metallic Mineral Products	0.31	0.21	0.19	0.31	0.29	0.21	0.36	0.29
	0.54	(0.29)	(0.17)	(0.37)	(0.36)	(0.36)	(0.66)	(0.36)

Table II: COE Estimates, by Country and Sector: 1997-2004 (cont.)

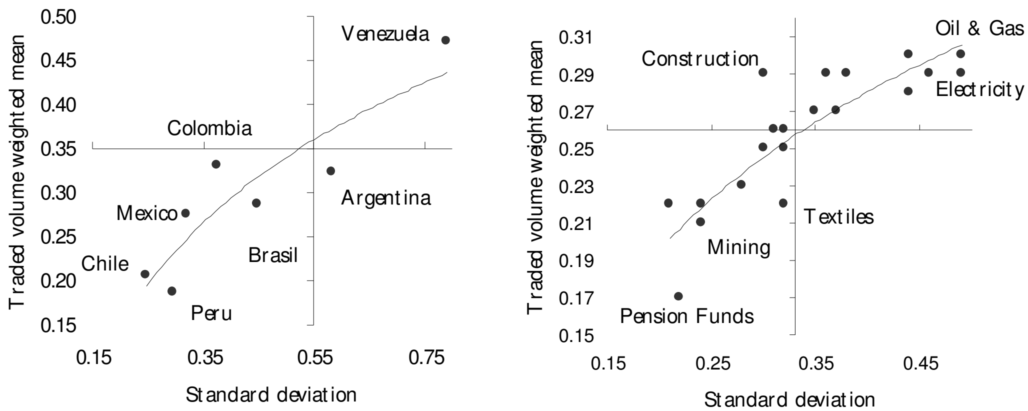
Sector	Argentina	Brazil	Chile	Colombia	Mexico	Peru	Venezuela	Latin America
Oil & Gas	0.24	0.31	0.19	0.56				0.30
	(0.45)	(0.50)	(0.21)	(0.62)				(0.49)
Others	0.34	0.25	0.17	0.31	0.32	0.12	0.19	0.29
	(0.47)	(0.36)	(0.21)	(0.34)	(0.38)	(0.21)	(0.37)	(0.38)
Paper & Paper Products	0.22	0.20	0.21	0.10	0.26		0.30	0.23
	(0.20)	(0.27)	(0.24)	(0.07)	0.29		0.56	(0.28)
Pension Funds			0.18			0.10		0.17
			(0.23)			(0.01)		(0.22)
Software & Data	0.22			0.12				0.21
	(0.25)			(0.04)				(0.24)
Steal & Metal Products	0.41	0.29	0.42		0.29	0.37	0.52	0.30
	(0.90)	(0.38)	(0.43)		0.34	0.52	1.01	(0.44)
Telecommunications	0.40	0.31	0.27	0.04	0.20	0.16	0.29	0.29
	(0.73)	(0.40)	(0.35)	(0.07)	(0.29)	(0.29)	(0.64)	(0.46)
Textiles	0.20	0.21	0.07	0.26	0.06	0.14	0.52	0.22
	(0.24)	(0.24)	(0.07)	(0.27)	(0.12)	(0.18)	(0.99)	(0.32)
Transportation & Storage	0.05	0.12	0.25		0.23		0.17	0.22
	(0.00)	(0.11)	(0.23)		(0.16)		(0.34)	(0.21)
Wholesale & Retail Trade	0.18	0.33	0.34	0.18	0.24	0.22		0.26
	(0.29)	(0.43)	(0.31)	(0.16)	(0.30)	0.36		(0.32)
All Sectors	0.32	0.29	0.21	0.33	0.18	0.19	0.47	0.3
	(0.58)	(0.45)	(0.25)	(0.37)	(0.32)	(0.30)	(0.79)	(0.47)

Source: Authors own calculations based on *Economatica*.

The left panel in Figure I shows that those countries posting the higher average COE estimates also display the more volatile estimates, confirming the usual positive risk-return trade off in standard portfolio theory. This pattern reflects both the market premium that investors require in each country and the greater sensitiveness to systematic risk. Venezuela and Argentina display the higher and more volatile COE estimates, while Chile and Peru, exhibit the lowest and less volatile estimates. The Peruvian relatively lower COE and associated risk may be on account of the improved macroeconomic performance the country experienced in recent years (low and stable inflation rates and low real GDP volatility).[15]

<Insert Figure I about here>

Figure I: Cost of equity estimates by country and sector (1997-2004)



Source: Authors own calculations based on *Economatica*.

On the right panel of Figure I we show the pattern of COE estimates across sectors for Latin America as a whole. Those sectors with the highest average COE estimates are found to

[15]. Indeed, average CPI inflation in 1997-2004 stands as the lowest in Latin America and the average real GDP volatility in Peru since 1997 sits well below those of Argentina, Venezuela, Colombia, and even Mexico.

display the most volatile estimates.[16] Since the pattern shown in Figure II is driven by the underlying beta coefficients, it illustrates to what extent systematic risk affects the COE across sectors. We find that Pension Funds and Agriculture & Fishing have the lowest cost of equity estimates in the sample, while Oil & Gas, Telecommunication, Finance and Insurance, Electricity and Construction firms carry the highest values.[17]

[16]Similar patterns are found when we look at each market separately.

[17] A plausible reason why Pension Funds display the lowest COE may be related with the fact that they hold more diversified investment portfolios than other sectors (with the exception of Argentina, where above 60% of their portfolio was invested in government bonds). The low COE estimates for Agriculture & Fishing may be related with the fact that this tradable sector is much more stable than other non-tradable ones. On the contrary, Construction firms are highly volatile because of their high sensitivities to the business cycle. COE estimates for Telecommunication and Electricity firms are surprisingly high because these firms have relatively stable sales (in domestic currency) and historically relatively low betas. However, expected profits in US current dollars are particularly uncertain because of country specific regulations and high exchange rate volatility in almost Latin American countries specially from the late 90s onward.

II. 4 Accounting for the sources of risk

How much of the average stock excess return (COE minus the risk-free rate) can be attributed to systematic risk in Latin American markets? Our econometric estimations find that on average a 33% of the variability in the typical Latin American stock excess return is attributable to systematic risk.

We get this result devising two alternative measures of the explained variance in the GMM regressions of our adjusted CAPM equation (equation (2)). The first measure is the regression adjusted-R^2 or goodness of fit which isolates the percentage of the total risk which is accounted for by systematic risk (as opposed to the residual, i.e unique risk). As stated earlier, the CAPM assumption on the efficiency of the market portfolio implies that it should fully capture the systematic component of risk. However, there are some disadvantages to using this measure, e.g. it is model dependent and is only a relative measure.

Goyal and Santa Clara (2003) provide an alternative variance decomposition procedure. Basically the methodology consist in first estimating the cross-sectional variance of stock (excess) returns in a given country at a certain moment in time to capture the systematic component of stock (excess) return volatility, and, second, to divide the latter by the average total stock risk.[18]

[18]Consider the following measure of total risk in a country. First, compute the variance of a stock (or collection of stocks) p using a 12 months moving window as:
(5)

$$V_{pt} = \sum_{i=0}^{11} r_{pt-i}^2$$

Where $r_{p,t-i}$ is stock p return in month t. Then compute the average stock variance as the arithmetic average

The results for both measures are presented in Table III. They are notably similar suggesting that, for Latin America as a whole, systematic risk accounts for nearly a third of stocks excess returns (and COE) variability. Argentina (43%, on average) and Venezuela (39%) stand with the greater share of systematic risk, consistently across measures. The relatively lower share of systematic risk is found in Peru (25%).

Table III: Measures of the Share of Systematic Risk by Country (1997-2004)

Country	Measure 1: Goodness of fit	Measure 2: Variance Decomposition (Goyal and Santa Clara)	Simple Average
Argentina	44%	41%	43%
Brazil	23%	33%	28%
Chile	32%	28%	30%
Colombia	40%	25%	33%
Mexico	44%	30%	27%
Peru	29%	21%	25%
Venezuela	41%	37%	39%
Average	36%	31%	33%

Source: Authors own calculations based on *Economatica*.

of the 12-month window variances of each stock return.
(6)

$$V_t = \frac{1}{N_t}\sum_{i=1}^{N_t}\left[\sum_{i=0}^{11} r_{pt-i}^2\right]$$

Where N_t is the number of stocks in the country of interest at each t. Analyzing together both measures, we derive the share of the total variance of returns explained by idiosyncratic risk, namely $1-\frac{V_{ew}}{V_t}$. With the size of this "residual" variable (unique risk) we obtain a measure of the potential miss-pricing error in CAPM models if at least one of the underlying assumptions does not hold.

Notice that, under the CAPM assumptions, the remaining two-thirds of the unexplained variance should be attributable to idiosyncratic, fully diversifiable risk. However, investors might not be able to fully diversify portfolios (as Levy, 1978, or Merton, 1987, among others, demonstrate). Diversification opportunities may be scarce in relatively shallow and illiquid markets including for Latin America as recent evidence points out [19] As a consequence, the part of the excess return and COE variance that remains unexplained could reflect a potential mispricing error in the cost of equity capital.

III. Robustness checks

III. 1. Test for international risk factors

In the decade to 2005 Latin American stock markets exhibited an increasing degree of co-movement and correlation with the most representative global markets. This phenomenon raises the question of whether Latin American markets are increasingly globally integrated, and in particular, to what extent a change in the assumptions regarding the integration of markets changes the estimates of the COE.

We test for the inclusion of global factors[20] into the adjusted CAPM equation estimated in section (2-3) following Koedijk, Kool, Schotman and Dijk (2002). They set forth a multifactor stock pricing model close to equation (7) below:

(7)

[19] See de la Torre, Gozzi and Schmuckler (2008).

[20] Solnik (1974), Sercu (1980 and 1981) and Adler and Dumas (1983) demonstrated that in a fully mobile capital world investors hold internationally diversified portfolios of risky assets and regard the risky security choices by how (in terms of risk and returns) they contribute to their internationally diversified portfolios.

$$R_{i,t} = \alpha_i + \beta_{iM}\left[R_{M,t}\right] + \beta_{iG}\left[R_{G,t}\right] + \beta_{iMNER}\left[R_{MNER,t}\right] + \varepsilon_{i,t}$$

where $\left[R_{G,t}\right]$ is the global market portfolio return, $\left[R_{MNER,t}\right]$ is the nominal multilateral exchange rate return, and β_{iG} and β_{iMNER} are the associated asset *i* return sensitivities or global factor loadings. The key idea is that there might be additional sources of systematic risk in the pricing of stocks not captured by local portfolios, if the firm's stock excess returns are correlated with excess returns on internationally diversified portfolios of stocks or currencies.

The null hypothesis to be tested is $H_0 \; : \; \beta_{iMNER} = \beta_{iG} = 0$. A rejection of H_0 would support a change in the specification of the domestic adjusted-CAPM model so as to incorporate global risk factors into equation (3). Notice that all variables are expressed in absolute and not in excess returns over a risk-free rate. Finally, we prefer to use multilateral real exchange rate returns instead of using nominal exchange rate returns in order to allow for deviations from the Purchasing Power Parity (PPP) rule and a partial correlation of local returns with inflation rates. As a result, we estimate Equation (8) below for each of the 921 firms in our sample over each of the (rolling) periods starting from the earliest observation possible:

(8)

$$R_{i,t} = \alpha_i + \beta_{iM}\left[R_{M,t}\right] + \beta_{iG}\left[R_{G,t}\right] + \beta_{iMRER}\left[R_{MRER,t}\right] + \varepsilon_{i,t}$$

Where $R_{MRER,t}$ stands for the return on a multilateral real exchange rate portfolio. Now $H_0 \; : \; \beta_{iMRER} = \beta_{iG} = 0$

We report the percentage of cases in which we reject H_0 in Table IV below. Rejection rates are small, averaging between 20% and 29% depending on the specification[21]. This implies that the global market portfolio and multilateral real exchange rates are not jointly statistically significant variables and should be disregarded as potential additional systematic risk factors in the determination of Latin America's COE.

Table IV: Percentage of tests that reject the null hypothesis of non-significant global factors

The rejection rates are calculated on the basis of volume-weighted GMM models using the number of monthly traded shares as within weights.

Country	Global Portfolio Return	Multilateral Real Exchange Rate Return	Joint Test	Period
Argentina	6	15	16	1990-2004
Brazil	14	23	28	1986-2004
Chile	5	15	14	1989-2004
Colombia	7	8	11	1993-2004
Mexico	6	23	18	1991-2004
Peru	7	7	8	1992-2004
Venezuela	8	10	14	1989-2004
Latin America	9	18	20	1986-2004

Source: Authors own calculations based on *Economatica*.

We conclude that global factors do not add explanatory power to domestic adjusted-CAPM regressions. Clearly, this result does not suggest that Latin American markets are isolated. In light of the increasing pattern of co-movement that the region stock markets exhibit, our tests instead might indicate that a great deal of the regional risk is indeed correlated with global

[21]Although we do not report the results in this paper, our tests exhibit increasing rejection percentages since 2000 and average p-values slightly decreasing over time.

risk and, at least over the time span we cover, the local market portfolio is sufficient to capture global sources of non-diversifiable risks affecting local stocks.

III. 2. Testing the Fama and French Three-Factor model: size and value premia

To check for the omission of other sources of systematic risk as put forth by Fama and French (1992, 1993, 1996 and 1998) and its applicability to our sample of Latin American stocks we proceed in the following way: First, we search for the presence and persistence of size (small firms carry higher expected returns than big firms) and value premia (distressed firms pay off higher returns than growth firms) in those stocks and compare the results with those found by Fama and French (1998) and Rouwenhorst (1999). Then, we rerun the basic adjusted CAPM adding the premia on size and value sorted portfolios to the local market risk premium.

III. 2.1. Descriptive Statistics

To compute the size and value premia we follow the procedure adopted by Fama and French (1998). For each year in our sample, we sort stocks according to their mean market equity capitalization or to their book-to-market value and group them into three portfolios: the top 33.3%, middle 33.3% and bottom 33.3%. Then, we drop the medium portfolios, so we only keep the big size (B), small size (S), high book-to-market (H) and low book-to-market (L) portfolios. Finally, we calculate the monthly value-weighed return on each portfolio (B, S, H and L respectively).

Table V reports the mean, median and standard deviation of each of the portfolios returns over 1997-2004. For benchmarking purposes, we also include the local market value-weighed portfolio in the first column. If small stocks (S) persistently outperformed big stocks (B) and value stocks (H) persistently outperformed growth stocks (L), then the mean (or median) return differences $S-B$ and $H-L$ should be positive and statistically different from zero.

Column 4 in Table V ($H-L$) shows positive $H-L$ mean and median return differences in only 4 of the 7 countries. However, none of them are statistically significantly different from zero. Furthermore, in the sole case where the $H-L$ mean return is significantly different from zero (Peru (t-value= -1.82)), $H-L$ turns out to be negative, contrary to our expectation. Similarly, we only find positive $S-B$ mean and median returns in two countries, namely Brazil and Peru but only the latter posts an $S-B$ mean return significantly different from zero (t-value: 1.78). In conclusion, there is no robust evidence of a presence and persistence of size and value premia in Latin American stocks over 1997-2004.

Table V: Annual Dollar Returns in Latin American Stock Markets, Size and Book-to-Market Ratios Sorted Portfolios: 1997-2004

Column I displays USD annual average returns on local market portfolios. Columns II through VII report USD annual average return on portfolios sorted by book-to-market ratios and market capitalization. For each country, the first row reports the value-weighed portfolio return. The second row displays the median return (in parentheses). The third row reports the standard deviation (in brackets) or the t-statistic of the mean difference tests (in braces, Columns V through VII).

sCountry	Domestic	Book-to-Market (Value)			Market Capitalization (Size)		
	Market (I)	H (II)	L (III)	H-L (IV)	Small (V)	Big (VI)	S-B (VII)
Argentina	0.24	0.24	0.23	0.01	0.13	0.24	-0.11
	(0.01)	(0.13)	(0.09)	(0.04)	(0.00)	(0.13)	(-0.08)
	[0.56]	[0.58]	[0.64]	{ 0.17}	[0.48]	[0.57]	{-1.39}
Brazil	0.40	0.38	0.41	-0.04	0.43	0.40	0.03
	(0.03)	(0.27)	(0.19)	(0.06)	(0.36)	(0.29)	(0.09)
	[0.74]	[0.71]	[1.05]	{-0.28}	[0.55]	[0.75]	{ 0.31}
Chile	0.15	0.15	0.16	-0.01	0.09	0.15	-0.06
	(0.01)	(0.11)	(0.06)	(0.03)	(0.06)	(0.09)	(0.01)
	[0.33]	[0.32]	[0.42]	{-0.24}	[0.20]	[0.33]	{-1.53}
Colombia	0.17	0.17	0.17	0.01	0.21	0.17	0.03
	(0.02)	(0.14)	(0.11)	(0.02)	(0.16)	(0.15)	(0.01)
	[0.38]	[0.37]	[0.43]	{0.12}	[0.39]	[0.40]	{0.50}
Mexico	0.21	0.22	0.19	0.02	0.14	0.21	-0.08
	(0.02)	(0.13)	(0.14)	(0.07)	(0.10)	(0.14)	(-0.05)
	[0.42]	[0.44]	[0.40]	{0.41}	[0.30]	[0.44]	{-1.40}
Peru	0.17	0.18	0.30	-0.12	0.26	0.17	0.09
	(0.00)	(0.15)	(0.17)	(-0.05)	(0.22)	(0.13)	(0.08)
	[0.32]	[0.35]	[0.55]	{-1.82}	[0.38]	[0.33]	{1.78}
Venezuela	0.34	0.31	0.22	0.10	0.25	0.34	-0.10
	(0.00)	(0.00)	(0.02)	(0.06)	(0.05)	(0.04)	(0.03)
	[0.88]	[0.93]	[0.79]	{ 0.71}	[0.59]	[0.93]	{-0.73}

Source: Authors own calculations based on *Economatica*.

Table VI exhibits the value ($H - L$) and size ($S - B$) premia found in Fama and French (1998), Rouwenhorst (1999) and the present study altogether. We only report figures for the stock markets sampled in our study. Rouwenhorst (1999) finds positive value premia in 5 of 6 countries, yet only one comes out statistically significant (Brazil). Fama and French (1998) find 3 stock markets displaying positive value premia but none is significantly different from zero. As to the size premia, the pattern is similar. Rouwenhorst (1999) reports positive size premia in 5 out of 6 countries yet only two among them pass the t-test (Argentina and Mexico). Fama and French (1998) also find positive size premia for the same markets (with the exception of Colombia), but none is statistically significant.

A caveat is in order. We often observe that either the $H - L$ or the $S - B$ “excess” returns yield opposite signs across studies or are statistically significantly different from zero in one study while not in the others. There are at least two limitations to this comparative analysis: 1) the sample period and the data frequency[22] do not coincide, and 2) the number of firms covered in each study is not the same. For instance, it has been documented in Latin America that a great deal of firms delisted more remarkably during the second half of the 1990s (see de la Torre, Gozzi and Schumckler, 2008). Notwithstanding this, all the three studies point to the lack of robust evidence of presence and persistence of size and value premia in Latin American stocks throughout the period 1982-2004.

[22]Our results do not change when we allow for the same data frequency as in Fama and French (1998) or Rouwenhorst (1999). These figures are available from the authors upon request.

Table VI: Size and Value Premia Across Three Studies

This table replicates the evidence on value and size premia for 7 Latin American stock markets from Fama and French (1998) and Rouwenhorst (1999) and contrasts their results to ours. H-L and S-B portfolios are formed as explained in section 3.2.1 with some minor differences about the frequency of the sorting of portfolios: Fama and French (1998) sort stocks using information at the end of each year, Rouwenhorst (1999) uses monthly information, and this paper uses annual averages. An * (asterisk) indicates statistically significant differences between mean returns.

Country	Book-to-Market H-L			Market Capitalization S-B		
	Rowenhorst 1999 1982-1997	Fama and French 1998 1987-1995	This Paper 1997-2004	Rowenhorst 1999 1982-1997	Fama and French 1998 1987-1995	This Paper 1997-2004
Argentina	1.68	-0.36	0.01	3.84*	0.04	-0.11
Brazil	3.94*	0.73	-0.04	1.76	0.12	0.03
Chile	1.07	0.15	-0.01	0.31	0.09	-0.06
Colombia	-0.36	-0.17	0.01	-0.68	-0.21	0.03
Mexico	1.39	0.00	0.02	2.39*	0.03	-0.08
Peru	Na	Na	-0.12*	Na	Na	0.09*
Venezuela	1.27	0.57	0.10	1.85	0.24	-0.10

Source: Authors own calculations based on *Economatica*.

III. 2.2. Econometric regression results

As said before, Fama and French (1993) introduce an extended CAPM model (FF3FM, Equation (9) below), where a firm's excess return over the risk-free rate is explained by the excess return on the market portfolio (CAPM systematic risk) and two additional factors designed to capture other sources of systematic risk apart from market portfolio risk: SMB (small minus big), which is the difference between the returns on well-diversified portfolios of small and big stocks or simply "size premium", and HML (high minus low), which is the difference between the returns on well-diversified portfolios of high and low book-to-market stocks or "value premium". More specifically:

9) $E(R_{i,t}) - R_{f,t} = \beta_{iM}\left[E(R_{M,t}) - R_{f,t}\right] + \beta_{iS}\left[E(SMB_t)\right] + \beta_{iH}\left[E(HML_t)\right]$

with

(10)

$$SMB_t = \sum_{j=\underline{\underline{j}}}^{\underline{j}} R_{j,t} w_{j,t}^{S} - \sum_{j=\bar{j}}^{\bar{\bar{j}}} R_{j,t} w_{j,t}^{B}$$

where $j \in \left[\underline{\underline{j}}, \bar{\bar{j}}\right]$ is a firm index, $\underline{\underline{j}}$ is the smallest firm (the company posting the lowest market capitalization), $\bar{\bar{j}}$ is the largest one, $\underline{j}$ is the upper bound firm of the small-size group (i.e. the 30^{th} percentile firm), $\bar{j}$ is the lower bound firm of the big-size group (the 70^{th} percentile firm), $w_{j,t}^{S} = MKC_{j,t} / \sum_{j=\underline{\underline{j}}}^{\underline{j}} MKC_{j,t}$ and $w_{j,t}^{B} = MKC_{j,t} / \sum_{j=\bar{j}}^{\bar{\bar{j}}} MKC_{j,t}$ are the market capitalization shares of firms $\left\lfloor \underline{\underline{j}}, \underline{j} \right\rfloor$ and $\left\lfloor \bar{j}, \bar{\bar{j}} \right\rfloor$, respectively (with $MKC_{j,t}$ being the firm j Market Capitalization at t); and

(11)

$$HML_t = \sum_{k=\bar{k}}^{\bar{\bar{k}}} R_{k,t} w_{k,t}^{H} - \sum_{k=\underline{\underline{k}}}^{\underline{k}} R_{k,t} w_{k,t}^{L}$$

where $k \in \left\lfloor \underline{\underline{k}}, \bar{\bar{k}} \right\rfloor$ is another firm index, $\underline{\underline{k}}$ is the firm displaying the lowest book-to-market ratio, $\bar{\bar{k}}$ is the firm with the highest book-to-market ratio, $\underline{k}$ is the 30^{th} percentile firm, $\bar{k}$ is the 70^{th} percentile firm, while $w_{k,t}^{H}$ and $w_{k,t}^{L}$ are defined in the same way as $w_{j,t}^{B}$ and $w_{j,t}^{S}$.

For each firm/country, we test the null hypothesis $H_0 : \beta_{iS} = \beta_{iH} = 0$ performing standard Wald tests on GMM estimations of β_{iS} and β_{iH} from Equation (9). A rejection of H_0 would imply that either SMB or HML or both are significant systematic risk factors and therefore should not be omitted in the pricing of firm's stocks and subsequent calculation of the COE. If that was the case, we would expect $\beta_{iS} > 0$ and $\beta_{iH} > 0$. By contrast, the non-rejection of H_0 would lead us to conclude that either SMB or HML or both do not add information to the domestic market portfolio in the explanation of firm's stock excess returns.

Table VII summarizes the percentage of Wald tests per country where the null hypothesis of insignificant FF factors is rejected at the 5% level. Overall, we conclude that the FF factors do not carry significant information for stock pricing in Latin America. On average, the percentage of Wald test rejection reaches 40% in Brazil (i.e. in 40% of the regressions we reject the null $H_0 : \beta_{iS} = \beta_{iH} = 0$) whereas it is generally below 30% in the other countries.

The relatively higher proportion of rejections in Brazil does not come as a surprise as 1) we observe the highest standard deviation of firm's size in Brazil (relative to other Latin American countries), which renders size a more meaningful risk factor; and 2) the relatively low explanatory power of CAPM in this country (see section 2) Table VIII presents the dynamic properties of the Wald test results, where no clear-cut time trend is observed in most Latin American stock markets. Nevertheless, it must be noticed that the rejection rates of the null hypothesis (non significant FF factors) are always below the 50% excluding Brazil in 2003.

Table VII: Proportion of Wald Tests Rejecting the Null Hypothesis of Non Significant Fama-French Factors

Rejection rates are computed on the basis of weighted GMM regressions using monthly traded shares as within weights.

Country	S-B (size premia)	H-L (value premia)	Joint test	Period
Argentina	0.12	0.12	0.18	1990-2004
Brazil	0.29	0.25	0.40	1986-2004
Chile	0.15	0.16	0.25	1989-2004
Colombia	0.15	0.20	0.31	1993-2004
Mexico	0.13	0.16	0.23	1991-2004
Peru	0.16	0.12	0.22	1992-2004
Venezuela	0.15	0.15	0.25	1989-2004
Latin America	0.20	0.19	0.31	1986-2004

Source: Authors own calculations based on *Economatica*.

Table VIII. Proportion of Wald Tests Rejecting the Null Hypothesis of Non Significant Joint Fama-French Factors

Yearly average by country obtained from weighted GMM regressions, using monthly traded shares as within weights

Year	AR	BR	CL	CO	MX	PE	VE	Lat. Am.
1990		0.31						0.31
1991		0.35						0.35
1992		0.45						0.45
1993		0.38	0.19					0.31
1994		0.39	0.21				0.29	0.32
1995		0.36	0.19		0.38		0.04	0.29
1996	0.20	0.28	0.16		0.22	0.35	0.24	0.24
1997	0.19	0.32	0.17	0.21	0.14	0.29	0.22	0.25
1998	0.20	0.32	0.18	0.39	0.13	0.17	0.21	0.23
1999	0.16	0.40	0.29	0.49	0.19	0.12	0.23	0.29
2000	0.18	0.42	0.32	0.35	0.22	0.15	0.17	0.30
2001	0.18	0.43	0.35	0.24	0.22	0.20	0.25	0.32
2002	0.15	0.47	0.32	0.25	0.25	0.28	0.33	0.34
2003	0.12	0.55	0.30	0.34	0.28	0.26	0.31	0.36
2004	0.23	0.48	0.26	0.25	0.31	0.21	0.33	0.34
Full Simple average	0.18	0.40	0.25	0.31	0.23	0.22	0.25	0.31

Source: Authors own calculations based on *Economatica*.

IV. Summary and Conclusions

This paper aimed to answer the following questions: which are the sources of risk driving Latin American stock prices and its corresponding opportunity cost in the period 1986-2004? How can the best fit of the opportunity cost of equity be obtained within the standard asset pricing framework?

Taking as starting point an adjusted version of CAPM, we first investigated how much of COE variability could be attributed to systematic (i.e., non-diversifiable) risk. We found that for Latin America as a whole, nearly a third of COE variability on average can be attributed to systematic sources of risk.

In a second step, we checked the robustness of these results to the inclusion of global stock and real currency portfolios. Here the question was: should internationally well-diversified portfolios be factored in the pricing of Latin American stocks? In fact, as Latin American countries opened up its capital markets to foreign investors and let its residents invest abroad, the question of how much of the individual stock risk borne by Latin American firms is correlated with global risk factors became pervasive. Our results suggested that global factors do not add explanatory power to domestic portfolios in the adjusted CAPM regressions, which may indicate that a significant fraction of regional stock market risk is indeed correlated with global risk and hence that local market portfolios are already capturing the relevant sources of global risk In other words, these results would imply no additional gains from diversifying away from the country market portfolios and into foreign stock and/or currency assets portfolios or possibly the other way around should we have tested an international adjusted CAPM (Sercu, 1980, Solnik, 1974) and then added the domestic market in the pricing equation. Other potential explanations could be the presence of a home bias or country barriers to investment in foreign stocks such as taxes, capital controls or currency inconvertibility that would prevent local investors to diversify their portfolios internationally.

In a third and last step, we tested for the omission of other sources of common risk originated in the size and book-to market value of stocks that pervade in their returns and that domestic market portfolios fail to price in. This is the Fama-French Three Factor Model (FF3FM, Fama and French 1992, 1993, 1996 and 1998). We concluded that: 1) both size and value premia are not generally statistically significant risk factors, and 2) they do not add informational power to the domestic market portfolio in the explanation of stock (excess) returns, with the exception of Brazil for some years. These findings are in line with Fama and French (1998) and Rouwenhorst (1999).

In short, an adjusted-version of CAPM which takes into consideration the lack of liquidity in Latin American stock markets, the instability of betas over time, the volatility in interest rates in an environment where these rates are not strictly risk-free and the across-sector dispersion of those betas turns out a "second" best model to estimate the firm's cost of equity. Notwithstanding this, we should caution against the use of these COE estimates to value common stock of Latin American firms, let alone their fair market value (see Bruner et al, 2002, for a discussion of alternative valuation methods for stocks, including for Latin American firms or Pereiro, 2006, for the specific case of Argentina). Further work may consider conditional versions of CAPM (Bonomo, 2001, Iqbal et al, 2009) or downside beta/semi-variance portfolio models (Galagedera, 2007) to estimate the cost of equity and assess their explanatory power compared to our regression results.

References

Adler, M., and Dumas, B., 1983. International Portfolio Selection and Corporation Finance: A Synthesis. Journal of Finance. 38, 925-984.

Altman, E.I., B. Jacquillet, and M. Levasseur, 1974. Comparative Analysis of Risk Measures: France and the United States. Journal of Finance. 29, 1495-1511.

Barclay, R., Fletcher, J. and Marshall, A., 2010. Pricing emerging market stock returns: An update. Emerging Markets Review. 11,1, 49-61

Barnes, M. and José Lopez, 2005. Alternative measures of the Federal Reserve banks' cost of equity capital. Working Paper Series 2005-06, Federal Reserve Bank of San Francisco.

Black, F., 1972. Capital Market Equilibrium with Restricted Borrowing. Journal of Business. 45,3, 444-454.

Bonomo, M. and Garcia, R. 2001. Tests of conditional asset pricing models in the Brazilian stock market. Journal of International Money and Finance. 20,1, 71-90

Bruner, R., Conroy, R.,Estrada, J, Kritzman, M. and Wei Li, 2002. Introduction to 'Valuation in Emerging Markets'. Emerging Markets Review. 3, 4, 310-324.

Carrera, J., Feliz, M.. and Panigo, D., 1998. Cuanto se asemejan las economias de Argentina y Brazil. Una comparacion de las regularidades empiricas desde 1980. Economica. XLV, 4, 93-163.

Daves, P., Ehrhardt, M. and Kunkel, R., 2000. Estimating systematic risk: The choice of return interval and estimation period. Journal of Financial and Strategic Decisions. 13, 1.

de la Torre, A., Gozzi, J.C. and Schmukler, S., 2008. Capital Market Development: Whither

Latin America?, NBER Chapters, in: National Bureau of Economic Research, Financial Markets Volatility and Performance in Emerging Markets, pp.121-154.

Druck, P. and Morón, E., 2001. The Twin Risks in the Dollarization Debate: Country and Devaluation Risks. Sextas Jornadas de Economía Monetaria e Internacional, La Plata, May 10-11.

Fama, E. F. and French, K. R., 1992. The Cross-Section of Expected Stock Returns. Journal of Finance. 47:2, 427-465.

Fama, E. F and French, K. R., 1993, Common Risk Factors in the Returns on Stocks and Bonds. Journal of Financial Eco*nomics*. 33, 3-56

Fama, E. F and French, K. R., 1996. Multifactor Explanations of Asset Pricing Anomalies. Journal of Finance. 51, 1,55-84.

Fama, E. F and French, K. R., 1998. Value versus Growth: The International Evidence. Journal of Finance. 53, 1975-1999.

Fama, E. F. and French, K. R., 2004. The CAPM: Theory and Evidence. *J*ournal of Economic Perspectives. 18, 25-46.

Fernandes, N., 2004. Market Integration and International Asset Allocation. Finance Letters, 4 (1), 4-8.

Ferson, W.E. and Jagannathan, R., 1996. Econometric evaluation of asset pricing models. Staff Report 206, Federal Reserve Bank of Minneapolis.

Galagedera, D, 2007. An alternative perspective on the relationship between downside beta and CAPM beta. Emerging Markets Review. 8, 1, 4-19.

Godfrey, S., and Espinosa, R., 1996. A Practical Approach to calculating Costs of Equity for Investments in Emerging Markets. Journal of Applied Corporate Finance, 80-89.

Grandes, M., Panigo, D. and Pasquini. R., 2007. The Cost of Corporate Bond Financing in Latin America. Center for Financial Stability Working Paper 20.

Gozzi, J.C., Levine, R. and Schmukler, S.., 2008.. Internationalization and the evolution of corporate valuation. Journal of Financial Economics, Elsevier, 88(3), 607-632, June

Goyal, A. and Santa Clara, P., 2003., Idiosyncratic Risk Matters! Journal of Finance. 58, 3, 975-1007.

Hail, L., and Leuz, C., 2004. International differences in the cost of equity capital: Do legal institutions and securities institutions matter? Working Paper 04–06,. Wharton Financial Institutions Center.

Hearn, B. and Piesse, J., 2009. Sector level cost of equity in African financial markets. Emerging Markets Review.10, 4, 257-278.

Iqbal, J, Brooks, R. and. Galagedera D, 2009. Testing conditional asset pricing models: An emerging market perspective. Journal of International Money and Finance. In Press, Corrected Proof, available online 28 December .

Kothari, S., Shanken, J.and Sloan, R., 1995. Another look at the cross-section of expected returns. Journal of Finance. 50, 185-224.

Koedijk, C.G., Kool, C.J.M. Schotman, P.C. and van Dijk, M.A., 2002. The cost of capital in international financial markets: local or global?, Journal of International Money and Finance. 21, 6, 905–929.

Levy, H., 1978. Equilibrium in an Imperfect Market: A Constraint in the Number of Securities in the Portfolio. The American Economic Review. 68, 4, 643-658.

Lintner, J., 1965..,The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. Review of Economics and Statistics. 47:1, 13-37.

Merton, R. C., 1973. An Intertemporal Capital Asset Pricing Model. Econometrica. 41:5, 867-887.

Merton, R. C. (1974), "On the pricing of corporate debt: The risk structure of interest rates". *Journal of Finance*, 29, 449-470.

Mishra, D. R. and O'Brien, T. J.,, 2001. A Comparison of Cost of Equity Estimates of Local and Global CAPMs. Financial Review, 36, 27-48.

Mishra, D. R. and O'Brien, T. J., 2005.. Risk and ex ante cost of equity estimates of emerging market firms. Emerging Markets Review. 6, 2, 107-120.

Pereiro, L., 2006. The practice of investment valuation in emerging markets: Evidence from Argentina. Journal of Multinational Financial Management, 16, 2, 160-183.

Roenfeldt, R.L., Griepentrof, G.L. and Pflaun, C.C., 1978. Further Evidence on the Stationarity of Beta Coefficients. Journal of Financial and Quantitative Analysis, 13,117-121.

Rouwenhorst, G. K., 1999. Local Return Factors and Turnover in Emerging Stock Markets. Journal of Finance. 54, 4, 1439-1464.

Scholes M. and Williams J., 1977. Estimating betas from non-synchronous data. Journal of Financial Economics. 5. 309-328.

Sercu P., 1980. A Generalization of the International Asset Pricing Model.Revue de l'Association Française de Finance. 1 (1), 91-135.

Sharpe, W. F., 1964. Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. Journal of Finance. 19,3, 425-442.

Smith, K.V., 1980. The Effect of Intervaling on Estimating Parameters of the Capital Asset Pricing Model. Journal of Financial and Quantitative Analysis. 13, 313-332.

Solnik, B., 1974. The international Pricing of risk: An Empirical Investigation of the World Capital Market Structure. Journal of Finance. 29, 48-54

Stattman, D., 1980. Book Values and Stock Returns. The Chicago MBA: A Journal of Selected Papers. 4, 25-45.

Stulz, R., 1981. A model of international asset pricing. Journal of Financial Economics., 9, 383-406.

Stulz, R., 1995a. The cost of capital in internationally integrated markets: The case of Nestlé. European Financial Management.,1, 11-22.

Stulz, R., 1995b. Globalization of capital markets and the cost of capital: The case of Nestlé. Journal of Applied Corporate Finance, Fall, 30-38.

Stulz, R.., 1999. Globalization of Equity Capital Markets and the Cost of Capital. NBER Working Paper 7021.

Vasicek, O., 1973. A note on using cross-sectional information in Bayesian estimation of security betas. Journal of Finance. 28, 1233-1239.

Wong, J., 2000. Are Changes in Spreads of External-Market Debt also Induced by Contagion? Intereconomics. 35, 2, 72-80.

Información para autores interesados en publicar en la Serie de Documentos de Trabajo de la Escuela de Negocios

Formato

Se aceptan manuscritos en español, portugués o inglés.

Los manuscritos no podrán exceder 50 páginas, incluyendo tablas y gráficos, utilizando interlineado 1,5, fuente Times New Roman 12 y márgenes amplios (2,5 cm izquierdo y derecho).

El texto deberá incluir una página de presentación con el nombre completo y afiliación del autor(es), un resumen de no más de 150 palabras, los códigos JEL *(Journal of Economic Literature* (JEL) Classification System) y un mínimo de 3 palabras clave.

De haber ecuaciones ellas se numerarán consecutivamente en estilo arábigo.
Las referencias bibliográficas se mencionarán utilizando el estilo del American Economic Review (ver http://www.aeaweb.org/sample_references.pdf)

La Escuela de Negocios y la Pontificia Universidad Católica Argentina entienden que la opinión vertida por el autor(es) es de su exclusiva responsabilidad.

Enviar el texto a la dirección electrónica: martin_grandes@uca.edu.ar.Se aceptan textos únicamente en formato Microsoft Word.

Frecuencia: no hay una periodicidad predeterminada. Los manuscritos los aprueba un comité editorial y se publican electrónicamente luego del proceso de edición y formateo.

Para más información ver

http://www.uca.edu.ar/index.php/site/index/es/universidad/escuela-negocios/investigacion-aplicada/serie-de-documentos-de-trabajo/