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Risk and return in emerging markets: Family matters

Javier Estrada [a,*], Ana Paula Serra [b,1]

[a] IESE Business School, Av. Pearson 21, 08034 Barcelona, Spain
[b] CEMPRE, Faculdade de Economia do Porto, Rua Dr. Roberto Frias, 4200 Porto, Portugal

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Abstract

The proper identification of the risk variables that explain the cross-section of returns in emerging markets has many and far-reaching implications for both companies and investors. We examine this risk–return relationship by focusing on three families of models, over 25 years of data, and over 1600 companies in 30 countries. We perform a statistical analysis that seeks to identify the variables that should be incorporated into the calculation of required returns on equity, and an economic analysis that seeks to determine the variables that produce the most profitable portfolio strategies. We find rather weak statistical results that prevent us from strongly recommending a given family to estimate required returns on equity. And we find somewhat stronger economic results that show that a variable belonging to our downside risk family, the global downside beta, is the one that has the largest impact on returns when portfolios are rebalanced every 5 years.

JEL classification: G12 (asset pricing)

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1. Introduction

There is by now a large and growing literature on the cross-section of returns in emerging markets (EMs), whose obvious ultimate goal is to isolate the variables that determine sub-

* Corresponding author. Tel.: +34 93 253 4200; fax: +34 93 253 4343.
E-mail addresses: jestrada@iese.edu (J. Estrada), aserra@fep.up.pt (A.P. Serra).
[1] Tel.: +351 22 557 1100; fax: +351 22 550 5050.

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stantial differences in returns across emerging stocks or countries. Although the discussion of this issue in EMs is much more recent than that in developed markets (DMs), it can hardly be said nowadays that this literature is still in its infancy.

This by no means implies that a consensus has been reached. In fact, over 30 years of debate have not generated a consensus on the topic in DMs, and given the peculiarities and the implied complexity of assessing risk in EMs, a consensus can hardly be expected in well under 10 years of discussion. However, in DMs, there at least seems to be a "model to beat", the CAPM, though no such model exists in EMs. In other words, in EMs, there is no standard, widely accepted way of estimating required returns on equity.

Nevertheless, the importance of this issue can hardly be overstated. Any project evaluation, company valuation, or capital-structure optimization, to name but a few, needs a cost of capital estimate, which is partially determined by the cost of equity, which in turn depends on the variables that explain the cross-section of stock returns. Furthermore, investment strategies are often based on selecting the riskiest portfolio from a ranking based on one or more risk variables, which reinforces the importance of determining the variables that explain the cross-section of returns. In short, though the literature on the topic has been growing, it perhaps needs to grow faster, at least until a "model to beat" surfaces in EMs.

Our goal in this paper is to compare the statistical and economic performance of three families of models usually considered separately in the literature. In our *traditional* family, we include models in which risk is assessed by two variables firmly grounded in modern portfolio theory, namely systematic risk (beta) and total risk (the standard deviation of returns). In our *factor* family, we consider models in which risk is measured by variables that have been shown to explain returns in DMs (and EMs) but are not grounded in portfolio theory, such as book-to-market and size. Finally, in our *downside risk* family, we include models in which risk is assessed by systematic downside risk (downside beta) and total downside risk (the semideviation of returns), both of which are the downside risk versions of the variables in the first family.

An important difference between our approach and much of the literature on the topic is that our analysis goes beyond statistics. Most studies on the cross-section of stock returns, both in DMs and in EMs, focus on the *statistical* significance of some selected variables. We do address that issue, but we also perform an *economic* analysis that seeks to evaluate the success of the variables we consider in the implementation of portfolio strategies. It may well be the case that a variable that is significant from a statistical point of view generates a spread in returns between a high-risk portfolio and a low-risk portfolio that no practitioner would consider substantial from an economic point of view. Hence, practitioners are usually more interested in economic (as opposed to statistical) significance.

We find it difficult to strongly recommend just one family of models to estimate required returns on equity in EMs. This is due to the fact that our risk variables are weakly related to returns, and that their impact on returns changes over time. These weak results may reflect that EM stocks are largely priced in local (rather than in global) markets. We also find it difficult to recommend just one family of models to implement portfolio strategies. This is due to the fact that at least one variable in each family generates some desirable result. When portfolios are rebalanced every 5 years, an approach followed by many investors, the global downside beta is the variable that generates the largest spread between high-risk and low-risk portfolios.

The rest of this article is organized as follows: Section 2 discusses the relevant literature and relates our approach to previous work on the subject; Section 3 discusses the data and variables we consider in our analysis; Section 4 reports and discusses the results of the statistical analysis; Section 5 does the same for the economic analysis; Section 6 concludes with a summary of results and a brief discussion. An appendix with tables concludes the article.

2. A brief literature review: approaches and results

Academics and practitioners that follow the debate on the cross-section of returns in EMs looking for guidance on how to estimate required returns on equity, or how to implement investment strategies, have many variables to consider, perhaps even more than in DMs. This is largely due to the fact that, when it comes down to isolating the relevant variables, practitioners, and academics in EMs are still shooting in the dark. The variables considered in the literature are in fact many and varied, and extend from those widely used in DMs, such as beta or book-to-market, to those that have been almost exclusively proposed for EMs, such as political risk or credit risk.

We consider in this study 10 variables grouped into three families of models: three variables in our *traditional* family (standard deviation, local beta, and global beta); four variables in our *factor* family (size and book-to-market, both in absolute terms and relative to the local market); three variables in our *downside risk* family (semideviation, local downside beta, and global downside beta). All these variables have been considered in previous studies, in some cases at the market level and in some others at the firm level, and our brief literature review immediately below focuses only on the most relevant results related to them.

Harvey (1995), perhaps the pioneer study on the cross-section of returns in EMs, finds that betas in most markets are low and largely not significant.[1] Subsequent research has produced somewhat contradictory evidence, though clearly leaning towards pointing that beta and returns are unrelated (see, for example, Bekaert et al., 1997; Claessens et al., 1998; Rouwenhorst, 1999; Estrada, 2000; Barry et al., 2002; Serra, 2003).[2] Furthermore, Bekaert et al. (1997), Harvey (2000), and Estrada (2000, 2002) find a significant relationship between the standard deviation and mean returns, thus implying that local (and not just systematic) risk is priced in EMs.

The variables in our factor models have also been considered in many studies with the overall conclusion that, just like in DMs, there is both a value premium and a size premium in EMs. In other words, both in DMs and in EMs value outperforms growth and small firms outperform large firms (see, for example, Fama and French, 1998; Patel, 1998; Rouwenhorst, 1999; Barry et al., 2002; Serra, 2003). The overall evidence also seems to show that the value premium is more robust than the size premium. And although there is consensus on

[1] Note that Harvey's (1995) data extend through June 1992 and, as is well known, both the correlations and betas of EMs with respect to the world market have increased substantially since then.

[2] However, Estrada (2001) finds that beta explains the cross section of *industry* returns in EMs, and Harvey (2000) and Estrada (2002) find that beta and mean returns are significantly related, the former during the 1988–1999 period and the latter during the 1988–2001 period.

the fact that value and size matter in EMs, there is less consensus on the type of risk these factors proxy for; some argue that they proxy for distress, some others that they proxy for mispricing.[3]

Finally, the variables in our downside risk family have been tested less extensively. Estrada (2000, 2001, 2002) and Harvey (2000) find that the semideviation and returns are positively and significantly related. Furthermore, Estrada (2000, 2002) and Harvey (2000) find a positive and significant relationship between returns and downside beta. The data used in all these studies are at the market level, unlike the firm-level data used in our study.

Many of the articles in the literature rely on regression analysis to determine the explanatory power of the selected variables. However, due to the fact that the results from cross-sectional regressions are very sensitive to the existence of outliers, some studies follow instead a portfolio approach. This method consists of forming portfolios on the basis of a given risk variable, and then evaluating the subsequent differences in returns between high-risk and low-risk portfolios (see, for example, Fama and French, 1998; Barry et al., 2002). As discussed below, our economic analysis is (similar but) different from such portfolio approach.

Finally, it is worth mentioning that part of the relevant literature is less interested on the statistical power of some variables and more focused on instructing practitioners about the best models to use when estimating the cost of equity in EMs. Godfrey and Espinosa (1996), Lessard (1996), Mariscal and Hargis (1999), and Pereiro (2001) are examples of this approach.

Our article is similar to others in the literature in the sense that we also want to determine the ability of several risk variables to explain the cross-section of returns in EMs. However, we depart from (and contribute to) the literature in at least two ways. First, we complement the statistical analysis with an economic analysis, with which we seek to assess the usefulness of our variables in the implementation of medium- and long-term investment strategies.[4] And second, we assess the relationship between returns in EMs and downside risk at the firm (rather than at the market) level; to our knowledge, we are the first to do this. Our ultimate goal in this study is to advice practitioners about the "best" family of models to use when estimating required returns on equity, as well as when implementing medium- and long-term investment strategies in EMs.

3. Data and variables

The main source of our data is the Standard and Poor's (S&P) Emerging Markets Data Base (EMDB). We use monthly data for over 1600 firms in 30 countries between the beginning of 1976 and the end of 2001, except for data on book-to-market which begins on

[3] Claessens et al. (1998) report results somewhat different to the consensus in the literature, with significant value and size effects but with the wrong sign in many markets. Serra (2003) also finds a size effect with the wrong sign in many markets.

[4] In this regard, our approach is more similar to that followed by Erb et al. (1995, 1996), Diamonte et al. (1996), and Bekaert et al. (1997).

April 1986.[5] We compute returns in dollars for all individual stocks following the S&P's methodology and adjust for dividends, which are assumed to be reinvested at the closing price on the ex-dividend date (ignoring taxes and transactions costs).

All the variables in the traditional and downside risk families (betas, downside betas, standard deviations, and semideviations) are computed using 60-month rolling returns. Local betas are computed with respect to each local market (S&P) index, and global betas with respect to the MSCI World index.

Book-to-market data are taken directly from the EMDB, and size is calculated by taking the log of price times the number of shares outstanding of all classes of stock. We use 6-month lagged book-to-market to account for delay in information transmission, and in the cross-sectional regressions we use 1-month lagged size to overcome the bid-ask bounce and thin-trading biases. We consider both variables in absolute terms and also relative to the local market. However, as discussed by Barry et al. (2002), differences in accounting systems make relative book-to-market more appropriate than absolute book-to-market. Whether relative or absolute size is more appropriate depends on the degree of market integration: in perfectly integrated markets stock selection should be based on absolute size, whereas in perfectly segmented markets it should be based on relative size.

Finally, in order to account for the possibility that our models may be mispecified thus rendering *t*-statistics invalid, we follow Ferson and Harvey (1999) and run all regressions (without and) with momentum. In order to proxy for this variable, we use the 6-month lagged return.

4. Statistical analysis

We assess in this section the explanatory power of the variables discussed above, grouped into the families also discussed above, using standard statistical analysis. We first briefly describe our methodology, and then discuss our results.

4.1. Methodology

In order to assess the explanatory power of each of our 10 risk variables, we run the standard Fama–MacBeth regressions (Fama and MacBeth, 1973). In each of these monthly cross-sectional regressions, we include all stocks with data available in each month, thus imposing a restriction of global pricing. In other words, we assume that the response of each stock to a change in any given risk variable is the same regardless of the country in which the stock trades (more on this below). As discussed above, we consider 10 risk variables, 3 in the traditional family, 4 in the factor family, and 3 in the downside risk family.

In the standard Fama–MacBeth fashion, we estimate monthly cross-sectional coefficients using the generalized method of moments (GMM), and obtain a time series

[5] Not all firms have returns available for the whole sample period. Furthermore, stocks that have missing or meaningless data, or that did not trade for four consecutive months, are excluded from the analysis. Also, note that stocks or markets are dropped from the EMDB when they no longer meet S&P's criteria. Portugal, for example, was re-classified as DM in 1999, and Portuguese stocks were dropped from the EMDB after March 1999.

of coefficients for each risk variable. We then use the standard deviations from the time series of each risk variable to calculate *t*-statistics, which we then use to evaluate significance.[6]

Because outliers are common in emerging markets, and because inference from cross-sectional regressions is sensitive to the existence of such outliers, we run all regressions with and without outliers. In the latter case, we exclude the observations in the bottom and top 5% of the relevant returns distributions. Finally, in order to assess the time-varying impact of our variables on returns, we run all regressions for the whole sample period (1982–2001), for two 10-year periods (1982–1991 and 1992–2001), and for four 5-year periods (1982–1986, 1987–1991, 1992–1996, and 1997–2001).

4.2. Results

Panel A of Table A.1 reports summary statistics for the 10 risk variables we consider. As can be seen in the table, these variables are very different across EMs. Global betas, for example, range from −0.4 in Slovakia to 3.2 in Russia; monthly standard deviations range from under 1% in Jordan and Morocco to almost 11% in Russia. Panel B of the same table shows the correlation between pairs of our 10 risk variables, and again we find a wide dispersion. The correlation between the standard deviation and the semideviation, for example, is very high (0.92), whereas that between local beta and book-to-market is very low (0.02). Some correlations, as expected, are negative.

Table 1 reports the results of our cross-sectional regressions for our three scenarios. For the whole sample period, only book-to-market (both in absolute and relative terms) is significantly correlated with returns and has the expected sign. The significance of this variable is consistent with results reported by Fama and French (1998), Rouwenhorst (1999), Barry et al. (2002), and Serra (2003). The rest of the variables are not significant, except for the local downside beta which is significant but has the wrong sign.

The results of the analysis by 10-year periods show that the value effect is significant only during the first half (1982–1991) but not during the second (1992–2001). In fact, the analysis by 5-year periods shows that the value effect clearly decreases over time.

We check the consistency of these results in two ways: first, by re-running all regressions without outliers, and then by re-running all regressions with momentum. Table 2 shows that when outliers are excluded the value effect for the whole sample period vanishes. This result is different from that that reported by Barry et al. (2002), who find that the value effect is robust to the exclusion of outliers.

Table A.2 follows Ferson and Harvey (1999) and adds to our cross-sectional regressions for the whole sample period the momentum variable. The figures show that, when confronted with an alternative explanation, only the value (absolute and relative) and size (relative) effects survive.

These results make it somewhat difficult for us to strongly recommend any given family for the estimation of required returns on equity in EMs. Although the factor family seems

[6] We also evaluate (but do not report) significance using precision weights as suggested by Litzenberger and Ramaswamy (1979). The results of this analysis, available upon request, are not substantially different from those reported under the Fama–MacBeth procedure.

Table 1
Fama–MacBeth cross-sectional regressions

Risk variable	20 years	10 years		5 years			
	1982–2001	1982–1991	1992–2001	1982–1986	1987–1991	1992–1996	1997–2001
LB	−0.005	−0.000	0.002	0.002	−0.002	−0.004	−0.002
	(−1.10)	(−0.03)	(0.19)	(0.19)	(−0.27)	(−0.97)	(−1.18)
GB	−0.004	−0.005	−0.003	−0.008	−0.002	0.003	−0.009
	(−1.09)	(−0.88)	(−0.64)	(−0.81)	(−0.33)	(0.91)	(−1.06)
S.D.	−0.077	0.002	−0.157	0.069	−0.064	−0.103	−0.211
	(−0.81)	(0.01)	(−1.39)	(0.26)	(−0.42)	(−0.97)	(−1.05)
BtM	0.003	0.004	0.002	0.008	0.003	0.003	0.000
	(2.27)	(1.96)	(1.24)	(2.63)	(1.14)	(1.33)	(0.24)
RBtM	0.003	0.005	0.001	0.009	0.004	0.002	0.001
	(2.87)	(2.83)	(1.11)	(2.04)	(2.04)	(1.07)	(0.49)
Size	−0.000	0.001	−0.001	0.001	0.000	−0.001	−0.001
	(−0.11)	(0.38)	(−0.88)	(0.48)	(0.00)	(−0.56)	(−0.68)
RSize	−0.000	−0.001	0.001	−0.002	−0.001	0.001	0.001
	(−0.84)	(−1.76)	(1.63)	(−1.28)	(−1.21)	(1.02)	(1.26)
LDB	−0.009	−0.006	−0.012	−0.005	−0.008	−0.006	−0.002
	(−2.74)	(−1.50)	(−2.29)	(−0.71)	(−1.57)	(−1.29)	(−1.94)
GDB	−0.004	−0.004	−0.004	0.000	−0.007	−0.001	−0.007
	(−1.26)	(−0.65)	(−1.41)	(0.00)	(−0.85)	(−0.46)	(−1.37)
SSD	−0.240	0.039	−0.521	0.283	−0.206	−0.396	−0.645
	(−1.17)	(0.12)	(−2.15)	(0.52)	(−0.50)	(−1.53)	(−1.57)

LB, local beta; GB, global beta; S.D., standard deviation; BtM, book-to-market; RBtM, relative book-to-market; size, log of market cap; RSize, relative size; LDB, local downside beta; GDB, global downside beta; SSD, semideviation. Local betas estimated with respect to the local market; global betas estimated with respect to the MSCI World index. RBtM and RSize relative to the local market. *t*-Statistics in parentheses.

to outperform the others in terms of significance, its impact on returns decreases over time and is largely not robust to the exclusion of outliers. In fact, our value effect seems to be weaker than that found by Barry et al. (2002), who report a value effect significant across periods and robust to the exclusion of outliers.

Perhaps these rather weak results are more a rejection of the assumption of global pricing built into our cross-sectional regressions than a rejection of our risk variables. In other words, it is possible that our results stem from the fact that each of our risk variables has an impact on returns which varies from country to country.

5. Economic analysis

The cross-sectional regressions reported and discussed in the previous section suffer from the problem that inference is highly dependent on the existence of outliers, and outliers are common in EMs. Many authors then prefer a portfolio approach, which

Table 2
Fama–MacBeth cross-sectional regressions (excluding outliers)

Risk variable	20 years	10 years		5 years			
	1982–2001	1982–1991	1992–2001	1982–1986	1987–1991	1992–1996	1997–2001
LB	−0.005	−0.002	−0.108	−0.004	−0.001	−0.001	−0.014
	(−1.79)	(−0.57)	(−1.94)	(−0.74)	(−0.08)	(−0.44)	(−1.92)
GB	−0.008	−0.001	−0.000	−0.005	0.002	0.003	−0.004
	(−0.43)	(−0.42)	(−0.16)	(−0.97)	(0.60)	(1.60)	(−0.91)
S.D.	−0.081	−0.034	−0.128	−0.106	0.038	0.066	−0.191
	(−1.42)	(−0.37)	(−1.83)	(−0.68)	(0.40)	(−0.95)	(−1.56)
BtM	0.001	0.002	−0.000	0.006	0.001	0.001	−0.001
	(1.03)	(1.71)	(−0.12)	(2.54)	(0.50)	(0.88)	(−1.56)
RBtM	−0.001	−0.001	−0.001	−0.002	−0.001	−0.001	−0.002
	(−1.68)	(−0.54)	(−2.31)	(−0.35)	(−0.42)	(−1.13)	(−2.19)
Size	0.000	0.001	−0.000	0.002	−0.000	−0.000	−0.000
	(0.45)	(1.06)	(−1.07)	(1.47)	(−0.51)	(−0.98)	(−0.58)
RSize	0.004	0.000	0.001	0.000	0.000	0.001	0.001
	(1.43)	(0.26)	(2.83)	(−0.06)	(0.48)	(1.80)	(2.18)
LDB	−0.007	−0.005	−0.008	−0.006	−0.005	−0.000	−0.015
	(−2.97)	(−2.00)	(−2.20)	(−1.28)	(−1.66)	(−0.13)	(−2.40)
GDB	−0.003	−0.003	−0.003	−0.005	−0.000	−0.011	−0.005
	(−1.47)	(−0.78)	(−1.61)	(−1.02)	(−0.06)	(−0.63)	(−1.48)
SSD	−0.206	−0.064	−0.347	−0.140	0.124	−0.190	−0.506
	(−1.71)	(−0.34)	(−2.27)	(−0.46)	(0.06)	(−1.15)	(−1.96)

LB, local beta; GB, global beta; S.D., standard deviation; BtM, book-to-market; RBtM, relative book-to-market; size, log of market cap; RSize, relative size; LDB, local downside beta; GDB, global downside beta; SSD, semideviation. Local betas estimated with respect to the local market; global betas estimated with respect to the MSCI World index. RBtM and RSize relative to the local market. *t*-Statistics in parentheses.

basically consists of ranking stocks by a given risk variable, partitioning the ranking, and comparing the returns of the riskiest and the least risky portfolio (see, for example, Fama and French, 1998; Barry et al., 2002, among many others). When implementing this approach, most authors rebalance portfolios very frequently, in some cases on a monthly basis. This is due to the fact that, most of the time, this technique is implemented not to evaluate the success of a given variable to implement an investable portfolio strategy but to improve upon the inference from cross-sectional regressions.

Our portfolio approach has a different goal. We do not seek with the analysis in this section to re-evaluate the statistical results reported in the previous section. Instead, our goal is to determine whether any of our 10 risk variables can be useful in the implementation of medium- and long- term portfolio strategies. In other words, we explore whether any of our 10 risk variables can be used as the basis of a successful (investable) trading scheme.

5.1. Methodology

The formation of portfolios and subsequent evaluation of returns is common to all our risk variables. Our methodology is straightforward: at every point of portfolio formation, we first rank all stocks by one given risk variable; then split the ranking into four quartiles; finally, assess the return performance of the riskiest and the least risky portfolio in the subsequent T years, where T may be 5, 10, or 20.

When beta, the standard deviation, downside beta, and the semideviation are used to rank portfolios, at any given point of portfolio formation, these variables are estimated on the basis of the previous 60 monthly returns. When book-to-market (absolute or relative) is used to rank portfolios, these parameters are taken with a 6-month lag to allow for information dissemination. Finally, when size (absolute or relative) is used to rank portfolios, these parameters are taken from the (log of the) most recent figure available. Our strategy is then investable in the sense that we form portfolios solely based on information known to investors at each point in time of portfolio formation.

The return of all portfolios is calculated as an equally weighted average of all stocks in the portfolio. If a stock is dropped from the EMDB between our inclusion of it in a portfolio and the end of the investment period, we “sell” the stock and spread the proceeds evenly across the other stocks in that portfolio.

We evaluate the return of portfolios in three different scenarios: one 20-year period (1982–2001) in which portfolios are formed at the beginning of 1982 and held through the end of 2001 without any rebalancing. Two 10-year periods (1982–1991 and 1992–2001) in which portfolios are rebalanced at the end of the first 10-year period; in this case, we assess performance in each 10-year period and in the combined 20-year period. And four 5-year periods (1982–1986, 1987–1991, 1992–1996, and 1997–2001) in which portfolios are rebalanced at the end of each 5-year period; in this case, we assess performance in each 5-year period and in the combined 20-year period. Of all these scenarios, rebalancing every 5 years seems to be the practice most often followed by investors.[7]

5.2. Results

Table A.3 reports the returns of all high-risk portfolios, low-risk portfolios, and the spreads between them for all our risk variables. Table 3 here reports *only the spreads* between high-risk and low-risk portfolios. To illustrate, over the 1982–2001 period, a portfolio of stocks with high global betas outperformed a portfolio of stocks with low global betas by 158%.

Let us consider the whole 20-year period first. The table shows that, when portfolios are formed at the beginning of 1982 and held through the end of 2001 without rebalancing, high-risk portfolios do outperform low-risk portfolios in all cases, except when the ranking is based on local betas and local downside betas. The variable that has the largest impact on returns is relative size, which generates a spread of more than 3000% over 20 years.

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[7] Note that performance across the different time horizons is affected by mean reversion. That is, the likelihood that high-risk portfolios outperform low-risk portfolios increases with the investment horizon. Having said that, most of the investment horizons considered in the analysis are relatively long from an investing point of view.

Table 3
Spreads in returns

Risk variable	1982–2001	20YCR	1982–1991	1992–2001	20YCR	1982–1986	1987–1991	1992–1996	1997–2001	20YCR
LB (%)	−1604	−1604	−548	−10	−1023	67	−112	61	67	4884
GB (%)	158	158	−553	−57	−1694	−111	−22	139	−17	−416
S.D. (%)	1117	1117	−343	137	527	1	385	16	111	4204
BtM (%)	N/A	N/A	N/A	−2	−2[a]	N/A	693	25	−10	1603[a]
RBtM (%)	N/A	N/A	N/A	−65	−65[a]	N/A	136	65	−20	477[a]
Size (%)	2694	2694	762	65	2265	48	257	−3	69	2160
RSize (%)	3086	3086	496	−25	611	−60	21	−6	46	125
LDB (%)	−1213	−1213	−1144	−38	−2599	25	−325	21	56	955
GDB (%)	322	322	−918	−8	−1911	−58	680	72	82	5443
SSD (%)	1075	1075	−571	51	−454	−38	407	28	106	3967

LB, local beta; GB, global beta; S.D., standard deviation; BtM, book-to-market; RBtM, relative book-to-market; size, log of market cap; RSize, relative size; LDB, local downside beta; GDB, global downside beta; SSD, semideviation; 20YCR, 20-year compound return. Local betas estimated with respect to the local market; global betas estimated with respect to the MSCI World index. RBtM and RSize relative to the local market. The table shows spreads between high-risk and low-risk portfolios.

[a] 20YCR for less than 20 years.

When portfolios are rebalanced every 10 years, we find, counterintuitively, than in most cases, the low-risk portfolios outperform the high-risk portfolios over 20 years, except when these are formed on the basis of the standard deviation and size (both in relative and absolute terms). Finally, in the most plausible scenario in which portfolios are rebalanced every 5 years, in all cases but one (global beta), the high-risk portfolios outperform the low-risk portfolios over 20 years. The variable that has the largest impact on returns is the global downside beta, which generates a spread of almost 5500%.

Table 4 shows the evolution of a US$ 1000 investment compounded at the returns shown in Table A.3, only for the case in which portfolios are rebalanced every 5 years. As can be seen in the table, a portfolio of high global downside betas outperforms one of low global downside betas by almost US$ 55,000 over 20 years.

Table 4
Evolution of a US$ 1000 investment

Panel A: HR and LR portfolios						Panel B: HR–LR portfolios	
Risk variable	Portfolio	Year-end				Portfolio	Year-end
		1986	1991	1996	2001		2001
LB (US$)	HR	2,319	18,844	47,294	75,796		
	LR	1,648	15,237	28,929	26,957	HR–LR	48,839
GB (US$)	HR	1,345	11,729	33,146	26,273		
	LR	2,453	21,931	31,465	30,429	HR–LR	−4,155
S.D. (US$)	HR	1,649	14,223	27,191	53,890		
	LR	1,635	7,813	13,659	11,851	HR–LR	42,039
BtM (US$)	HR	N/A	9,833	21,607	22,506		
	LR	N/A	2,904	5,653	6,475	HR–LR	16,032
RBtM (US$)	HR	N/A	6,454	15,360	15,354		
	LR	N/A	5,092	8,805	10,584	HR–LR	4,769
Size (US$)	HR	1,720	10,072	18,700	27,673		
	LR	1,245	4,085	7,699	6,073	HR–LR	21,600
RSize (US$)	HR	1,461	7,240	13,276	18,604		
	LR	2,059	9,771	18,499	17,351	HR–LR	1,253
LDB (US$)	HR	1,723	11,057	25,080	40,885		
	LR	1,470	14,215	29,218	31,336	HR–LR	9,550
GDB (US$)	HR	1,463	16,678	41,264	68,181		
	LR	2,046	9,414	16,523	13,748	HR–LR	54,433
SSD (US$)	HR	1,671	14,353	27,548	52,423		
	LR	2,048	9,259	15,181	12,755	HR–LR	39,669

LB, local beta; GB, global beta; S.D., standard deviation; BtM, book-to-market; RBtM, relative book-to-market; size, log of market cap; RSize, relative size; LDB, local downside beta; GDB, global downside beta; SSD, semideviation; HR, high-risk portfolio; LR, low-risk portfolio; HR–LR, spread between high-risk and low-risk portfolios. Local betas estimated with respect to the local market; global betas estimated with respect to the MSCI World index. RBtM and RSize relative to the local market.

Note that the standard deviation and size (both in absolute and relative terms) are the only variables for which the high-risk portfolios outperform the low-risk portfolios in all three scenarios (no rebalancing, rebalancing every 10 years, and rebalancing every 5 years). Note, furthermore, that as discussed above the global downside beta is the variable that has the largest impact on returns in the most plausible scenario (when portfolios are rebalanced every 5 years). All this makes it difficult for us to strongly recommend one family of models on which to base portfolio strategies; at least one variable in each family generates some desirable result.

6. Concluding remarks

The importance of properly identifying the variables that explain the cross-section of returns in EMs can hardly be overstated. Companies and investors engaged in the evaluation of projects, the valuation of firms, the optimization of capital structures, and the implementation of investment strategies, among many other activities, need to know the risk variables that ultimately determine expected returns.

The literature has responded to this challenge with almost 10 years of discussion that has produced many new insights but not much consensus. We have learned, however, that total risk seems to matter more than systematic risk; that some factors that seem to matter in DMs, such as book-to-market and size, also seem to matter in EMs; that differences in (total and systematic) downside risk seem to be associated to differences in returns. Perhaps, the next logical step is the emergence of a “model to beat,” a role played by the CAPM in DMs.

We have attempted to contribute to this literature by performing a statistical and economic analysis of the risk–return relationship in EMs using a dataset that expands over 25 years, over 1600 companies, and 30 countries. We have performed the statistical analysis with the goal of identifying the variables that need to be considered in the estimation of required returns on equity, and the economic analysis with the goal of determining the variables that produce the most profitable portfolio strategies.

Our statistical analysis produced results that are less clear-cut than we hoped. We do find that absolute and relative book-to-market are significantly related to returns over the whole sample period, but we also find that such relationship weakens over time. We believe that these weak results are more a rejection of the assumption of global pricing built into our cross-sectional regressions than a rejection of our risk variables. In other words, we believe that our rather weak results may be due to the fact that each of our risk variables has an impact on returns which varies from country to country.

Our economic analysis produced somewhat clearer results, but still not strong enough for us to unmistakably recommend a given family on which to base portfolio strategies. We find that total risk and (absolute and relative) size are the only three variables for which high-risk portfolios outperform low-risk portfolios in the three scenarios we consider (no rebalancing, rebalancing every 10 years, or rebalancing every 5 years). We also find that the global downside beta is the variable that has the largest impact on portfolio returns in our most plausible scenario (when portfolios are rebalanced every 5 years). Over our 20-year period, a portfolio of stocks with high (global) downside betas, rebalanced every 5 years, outperformed one with low (global) downside betas, also rebalanced every 5 years, by almost 5500%.

Perhaps, our hope of finding a model or family of models that is the “best” for *both* estimating required returns on equity and implementing portfolio strategies was misguided. Perhaps, the very nature of EMs prevents the finding of such “neat” results. Or perhaps, academics and practitioners should strengthen their efforts to find a consensus model that both companies and investors can rely on when making critical decisions in EMs.

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Appendix A

See Tables A.1–A.3.

Table A.1
Summary statistics and correlations

Market	LB	GB	S.D. (%)	BtM	RBtM	Size	RSize	LDB	GDB	SSD (%)	NM
Panel A: summary statistics											
Argentina	1.0	0.3	7.4	2.3	1.0	1.8	1.0	1.1	1.6	3.2	217
Brazil	1.0	0.9	7.3	2.2	1.0	2.5	1.0	1.1	2.3	2.6	220
Chile	1.0	0.2	2.4	1.0	1.0	10.0	1.0	1.1	1.3	1.0	312
China	0.9	−0.1	3.1	0.5	1.0	7.6	1.0	1.0	1.6	1.5	108
Colombia	1.0	0.1	1.8	1.9	1.0	11.0	1.0	1.1	1.2	0.8	204
Czech Republic	0.9	0.4	2.2	2.4	1.0	8.0	1.0	1.1	1.2	0.8	95
Egypt	0.8	0.0	1.5	0.6	1.0	5.9	1.0	1.0	0.8	0.8	71
Greece	0.8	0.4	1.5	0.5	1.0	9.1	1.0	0.9	1.1	0.6	312
Hungary	0.9	1.5	2.4	0.8	1.0	9.9	1.0	1.0	2.3	1.0	108
India	0.9	0.2	1.4	0.8	1.0	7.4	1.0	1.1	1.1	0.5	312
Indonesia	1.1	1.3	4.9	1.0	1.0	13.3	1.0	1.1	2.8	1.7	144
Jordan	0.8	0.2	0.7	0.9	1.0	2.8	1.0	0.9	0.9	0.3	287
Korea	1.0	0.7	2.6	1.6	1.0	11.5	1.0	1.0	1.9	1.1	312
Malaysia	1.2	1.3	2.9	0.7	1.0	6.7	1.0	1.3	1.9	1.2	204
Mexico	1.0	1.0	3.4	1.2	1.0	4.9	1.0	1.1	1.8	1.1	312
Morocco	1.1	−0.2	0.6	0.4	1.0	8.3	1.0	1.2	0.4	0.2	71
Pakistan	0.9	0.2	1.7	0.9	1.0	6.6	1.0	1.1	1.3	0.7	204
Peru	1.0	1.0	2.4	1.2	1.0	4.8	1.0	1.2	2.2	1.0	108
Philippines	1.0	0.9	3.3	1.0	1.0	8.1	1.0	1.1	2.1	1.4	204

Table A.1 (*Continued*)

Market	LB	GB	S.D. (%)	BtM	RBtM	Size	RSize	LDB	GDB	SSD (%)	NM
Poland	0.9	1.7	3.5	0.7	1.0	8.1	1.0	1.0	2.6	1.3	108
Portugal	1.0	1.0	2.1	0.7	1.0	10.3	1.0	1.1	1.6	1.0	158
Russia	1.0	3.2	10.5	2.6	1.0	12.2	1.0	1.1	4.1	3.3	71
Slovakia	1.0	−0.4	3.0	4.2	1.0	8.0	1.0	1.3	1.1	1.2	71
South Africa	1.0	0.8	1.5	0.7	1.0	8.7	1.0	1.1	1.6	0.5	108
Sri Lanka	1.0	0.5	1.6	1.3	1.0	7.0	1.0	1.1	1.5	0.6	108
Taiwan	1.0	0.7	2.8	0.6	1.0	9.7	1.0	0.9	1.5	1.0	204
Thailand	1.1	0.7	2.7	1.0	1.0	8.2	1.0	1.2	1.6	1.1	312
Turkey	1.0	0.6	5.9	0.4	1.0	15.3	1.0	1.0	2.2	2.4	180
Venezuela	1.0	0.1	3.6	1.7	1.0	9.4	1.0	1.1	1.5	1.4	204
Zimbabwe	0.9	0.3	3.0	1.5	1.0	4.1	1.0	1.1	1.5	1.1	312
Average	1.0	0.6	3.1	1.2	1.0	8.0	1.0	1.1	1.7	1.2	188
Panel B: correlations between risk variables											
LB	1.00	0.34	0.56	0.02	0.02	0.08	0.10	0.87	0.44	0.52	N/A
GB		1.00	0.18	−0.05	−0.05	0.10	0.08	0.26	0.59	0.15	N/A
S.D.			1.00	0.20	0.20	−0.30	−0.22	0.64	0.56	0.92	N/A
BtM				1.00	1.00	−0.40	−0.26	0.08	0.10	0.19	N/A
RBtM					1.00	−0.40	−0.26	0.08	0.10	0.19	N/A
Size						1.00	0.83	−0.02	−0.15	−0.27	N/A
RSize							1.00	0.02	−0.12	−0.19	N/A
LDB								1.00	0.49	0.66	N/A
GDB									1.00	0.51	N/A
SSD										1.00	N/A

LB, local beta; GB, global beta; S.D., standard deviation; BtM, book-to-market; RBtM, relative book-to-market; size, log of market cap; RSize, relative size; LDB, local downside beta; GDB, global downside beta; SSD, semideviation; NM, number of months. Local betas estimated with respect to the local market; global betas estimated with respect to the MSCI World index. RBtM and RSize relative to the local market. Market caps in millions of US dollars.

Table A.2
Fama–MacBeth cross-sectional regressions (with momentum)

Risk variable	Intercept	*t*-Statistics	Risk variable	*t*-Statistics	MOM	*t*-Statistics	WT
LB	0.002	0.59	−0.002	−0.88	0.049	1.59	0.18
GB	0.001	0.32	−0.001	−0.93	0.052	1.71	0.18
S.D.	0.003	0.79	−0.007	−1.34	0.055	1.77	0.20
BtM	−0.000	−0.04	0.002	2.09	0.046	1.25	0.16
RBtM	−0.001	−0.17	0.003	2.92	0.052	1.36	0.15
Size	0.003	0.46	−0.000	−0.08	0.054	1.79	0.21
RSize	0.001	−0.37	−0.002	−3.86	0.068	2.46	0.18
LDB	0.003	0.80	−0.003	−1.22	0.049	1.58	0.18
GDB	0.002	0.68	−0.001	−1.44	0.049	1.59	0.18
SSD	0.003	0.75	−0.155	−1.37	0.055	1.82	0.20

LB, local beta; GB, global beta; S.D., standard deviation; BtM, book-to-market; RBtM, relative book-to-market; size, log of market cap; RSize, relative size; LDB, local downside beta; GDB, global downside beta; SSD, semideviation; MOM, momentum; WT, Wald test. Local betas estimated with respect to the local market; global betas estimated with respect to the MSCI World index. RBtM and RSize relative to the local market. MOM is the monthly return lagged 6 months. WT column shows *p*-values for the Wald test.

Table A.3
Portfolio returns

Risk variable	Portfolio	1982–2001	20YCR	1982–1991	1992–2001	20YCR	1982–1986	1987–1991	1992–1996	1997–2001	20YCR
LB (%)	HR	2132.2	2132.2	1013.0	55.0	1624.7	131.9	712.4	151.0	60.3	7479.6
	LR	3736.6	3736.6	1561.2	65.4	2647.6	64.8	824.7	89.9	−6.8	2595.7
	HR–LR	−1604.4	−1604.4	−548.2	−10.4	−1022.9	67.2	−112.3	61.1	67.1	4883.9
GB (%)	HR	2163.6	2163.6	636.6	72.4	1169.9	34.5	771.9	182.6	−20.7	2527.3
	LR	2005.8	2005.8	1189.6	129.8	2863.7	145.3	793.9	43.5	−3.3	2942.9
	HR–LR	157.8	157.8	−553.1	−57.4	−1693.8	−110.8	−22.0	139.1	−17.4	−415.5
S.D. (%)	HR	3644.7	3644.7	675.2	193.3	2174.1	64.9	762.4	91.2	98.2	5289.0
	LR	2527.4	2527.4	1018.2	56.2	1647.0	63.5	377.8	74.8	−13.2	1085.1
	HR–LR	1117.3	1117.3	−342.9	137.1	527.1	1.4	384.6	16.3	111.4	4203.9
BtM (%)	HR	N/A	N/A	N/A	157.9	157.9*	N/A	883.3	119.7	4.2	2150.6*
	LR	N/A	N/A	N/A	159.5	159.5*	N/A	190.4	94.7	14.5	547.5*
	HR–LR	N/A	N/A	N/A	−1.5	−1.5*	N/A	692.9	25.1	−10.4	1603.2*
RBtM (%)	HR	N/A	N/A	N/A	111.9	111.9*	N/A	545.4	138.0	0.0	1435.4*
	LR	N/A	N/A	N/A	176.8	176.8*	N/A	409.2	72.9	20.2	958.4*
	HR–LR	N/A	N/A	N/A	−64.9	−64.9*	N/A	136.2	65.1	−20.2	476.9*
Size (%)	HR	4025.6	4025.6	1461.8	128.8	3473.5	72.0	485.5	85.7	48.0	2667.3
	LR	1332.0	1332.0	699.7	63.6	1208.5	24.5	228.1	88.5	−21.1	507.3
	HR–LR	2693.6	2693.6	762.1	65.2	2265.1	47.5	257.4	−2.8	69.1	2160.0
RSize (%)	HR	3762.8	3762.8	1341.1	70.4	2355.7	46.1	395.7	83.4	40.1	1760.4
	LR	676.3	676.3	844.8	95.3	1744.8	105.9	374.6	89.3	−6.2	1635.1
	HR–LR	3086.5	3086.5	496.3	−24.9	610.9	−59.8	21.1	−5.9	46.3	125.3
LDB (%)	HR	1762.7	1762.7	459.5	70.0	851.3	72.3	541.7	126.8	63.0	3988.5
	LR	2975.6	2975.6	1603.7	108.4	3450.3	47.0	866.7	105.5	7.2	3033.6
	HR–LR	−1212.9	−1212.9	−1144.2	−38.4	−2599.1	25.3	−325.0	21.3	55.8	955.0
GDB (%)	HR	2731.4	2731.4	500.3	94.8	1069.2	46.3	1039.7	147.4	65.2	6718.1
	LR	2408.9	2408.9	1418.2	102.9	2980.5	104.6	360.1	75.5	−16.8	1274.8
	HR–LR	322.5	322.5	−917.9	−8.1	−1911.3	−58.3	679.6	71.9	82.0	5443.3
SSD (%)	HR	3086.5	3086.5	672.1	99.5	1440.2	67.1	759.1	91.9	90.3	5142.3
	LR	2011.7	2011.7	1242.7	48.5	1894.5	104.8	352.0	64.0	−16.0	1175.5
	HR–LR	1074.9	1074.9	−570.7	51.0	−454.3	−37.8	407.1	28.0	106.3	3966.9

LB, local beta; GB, global beta; S.D., standard deviation; BtM, book-to-market; RBtM, relative book-to-market; size, log of market cap; RSize, relative size; LDB, local downside beta; GDB, global downside beta; SSD, semideviation; HR, high-risk portfolio; LR, low-risk portfolio; HR–LR, spread between high-risk and low-risk portfolios. Local betas estimated with respect to the local market; global betas estimated with respect to the MSCI World index. RBtM and RSize relative to the local market.
Asterisk (*) indicates 20YCR for less than 20 years.

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