Size, Value, and Momentum in Emerging Market Stock Returns*

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Comments welcome.

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Abstract

The paper examines value and momentum effects in 18 emerging stock markets. Using stock level data from January 1990 to December 2011, we find strong evidence for value and momentum in all emerging regions, except Eastern Europe (no momentum). We investigate size patterns in value and momentum. We form portfolios sorted on size and B/M and size and lagged momentum and use the CAPM, the three-factor model and the four-factor model to explain these portfolio returns using factors constructed using local, US, or aggregate global developed stock markets data. Local factors perform much better which indicates emerging market segmentation.

1 Introduction

Emerging markets constitute an increasing share of the world stock portfolio. While financial research has highlighted interesting value and momentum effects for the US and other developed markets, the emerging markets are not explored to the same level of detail because of issues with availability of high quality and comprehensive data.

Pioneering work by Fama and French (1998), Griffin, Ji, and Martin (2003), and Rouwenhorst (1998, 1999) show that value and momentum effects are present in emerging country stock markets: Value stocks with higher book equity to market equity (B/M) ratios have higher average returns than growth stocks which have low B/M ratios, and stocks with large cumulative returns over the past year continue to do better. These papers provide no details as to the size patterns in value and momentum effects, the first contribution we try to make in this paper.

Our second contribution is to evaluate the Capital Asset Pricing Model, CAPM, the three-factor model of Fama and French (1993), and finally the four-factor model of Carhart (1997) in emerging markets. We try to explain local cross-sections of portfolios formed on size and B/M and size and last year's cumulative return (lagged momentum). On the right hand side of our regressions, we use explanatory factors constructed using local stock market data, as well as using US (or developed stock markets) data. Comparing the performance of local and US factors in explaining local returns allows us to comment on emerging market integration with the US. Our market integration results add to a large integration literature which focuses on primarily on aggregate market returns (see for example Bekaert, Harvey, and Lumsdaine, 2002, and Bekaert and Harvey, 2003). To the best of our knowledge, this

paper is the first to construct for the emerging markets; the B/M and momentum explanatory factors as well as the double sorted left hand side portfolios similar to the papers focusing on US and developed markets (see for example Fama and French, 1993 and 2011, and Griffin, 2002).

Our results are easily summarized in four points. First, we confirm the very existence of value and momentum effects in emerging markets, providing fresh"out-of-sample" evidence for the results presented in the literature. Second, we find that, in emerging markets, value effect is pretty similar across the small and big stocks: a result which contrasts with the findings in developed markets. On the other hand, momentum effect is meaningfully larger for small stocks: a result which mimics the findings in developed markets. Third, we find that value and momentum returns are negatively correlated in emerging markets, in line with the result previously established in the literature for developed markets. Lastly, in asset pricing tests explaining the returns of portfolios formed on value and momentum, local factors perform a lot better than US factors: a result which indicates emerging market segmentation. Next, we briefly describe the dataset used in this study and our methodology, then we expand upon each of these four results in some detail.

We use stock level data from 18 emerging countries available from Datastream from January 1990 to December 2011 and following Morgan Stanley's Capital International Perspectives, MSCI, group the countries into four emerging regions. The first three regions are Asia (8 countries), Latin America (5 countries), and Eastern Europe (5 countries). The fourth region is the All-Emerging region, which includes all of the 18 countries together. We evaluate the performance of the CAPM, Fama and French (1993) three-factor model and

Carhart (1997) four-factor model. In our asset pricing tests, the left hand side (LHS) returns are the local size and B/M or size and lagged momentum portfolios resulting from 5x5 independent sorts. To analyze the degree of market integration between emerging markets and the US, we use local right hand side (RHS) factors calculated from local as well as from US stock market data. We also use RHS factors calculated using data from global developed stock markets data (henceforth, the Global Developed factors). The Global Developed region includes 23 developed economies of the world and together with US, the factor data are available from Ken French's website.[1]

First, we confirm the very existence of value and momentum effects in emerging markets, providing new evidence for the recent results presented in Asness, Moskowitz, and Pedersen (2009), Fama and French (1998, 2011), Griffin (2002), Griffin, Ji, and Martin (2003), Hou, Karolyi, and Kho (2011), and Rouwenhorst (1998) for US and developed markets and in Fama and French (1998), van der Hart, Slagter, and van Dijk (2003), Hou, Karolyi, and Kho (2011), and Rouwenhorst (1999) for emerging markets. Our study updates the existing emerging market results, since our data period is a lot more recent: an important point because of the sheer increase in emerging markets' size particularly in the last decade.

We find that there is value premia in all of the four emerging regions: Asia, Latin America, Eastern Europe, as well as the All-Emerging region. Considering the broader markets with small and big stocks together, the point estimates for the mean value premia are 1.03%, 0.66%, 1.88%, and 1.15% per month, respectively for the four emerging regions and the estimates are all statistically significant at the 5% level. These value premia point estimates

[1] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/.

are larger than US (0.30%) and the Global Developed (0.40%). Turning to momentum, we find momentum premia in all of the emerging regions, except Eastern Europe. Considering broader markets with small and big stocks together, the monthly point estimates are 0.93%, 0.96%, and 0.86% for Asia, Latin America, and the All-Emerging region. And these point estimates are all statistically significant and larger than the momentum premia in US (0.55%) and in the Global Developed (0.66%) region.

Second, we explore the size patterns in value and momentum premia. We find that in all of the four emerging markets, the value premia point estimates are similar for big and small stocks, both in magnitude and in statistical significance. This result contrasts with the US and the Global Developed region results. Because in US and Global Developed regions, the small stock value premium is much larger than the big stock value premium; and while small stock premium is statistically significant, big stock premium is not. The importance of this result is that an investor pursuing a value strategy in emerging markets can as well implement the strategy on the big stock universe and reap similar returns while at the same time taking advantage of higher liquidity and depth typically associated with big stocks. In US and the Global Developed region on the other hand, there is a tradeoff. Turning to the size patterns in momentum premia, in all of the three emerging regions for which we actually find momentum, small stock momentum premia is larger than the big stock premia. Moreover almost always, the small stock premia is significant while the big stock premia is not. And the US and the Global Developed region have the same pattern: small stock momentum premia is larger and statistically significant; big stock premia is smaller and not significant.

Third, we consider the correlations between value and momentum returns in emerging markets. Asness, Moskowitz, and Pedersen (2009) report negative correlations between value and momentum returns in US and several developed markets they consider. We find the same negative correlations between the value and the momentum returns in all of our four emerging regions. The implication is that a simple equal-weight portfolio of emerging value and momentum returns can lead to higher Sharpe ratios, and lower volatilities: a significant benefit because emerging market value or momentum strategies have higher volatilities than US or the Developed Global region.

Lastly, we turn to the results of our asset pricing tests. The RHS portfolios are either the 25 size and BM or the size and lagged momentum double sorted cross-sections constructed using the stock market data of the region: Asia, Latin America, Eastern Europe, and the All-Emerging region. We explain the RHS returns, using either local factors or factors constructed from US or the Global Developed region data. The asset pricing model can be the CAPM, the three-factor model or the four factor model. There are two ways to look at model performance: economic and through the lens of particular formal statistical tests. From an economic point of view, to explain local cross-sections using US or Global Developed factors turns out to be a futile exercise. Because, almost always, the intercepts are a lot larger in magnitude and the R^2s are much lower relative to using local factors. Moreover, in the language of Gibbons, Ross, and Shanken (1989), GRS, and Lewellen, Nagel, and Shanken (2010) the Sharpe ratios left unexplained by the model are substantially higher using US or Global Developed factors rather than local. This finding provides new evidence about the degree of emerging market segmentation.

Turning to our statistical results, and focusing on the size and B/M cross-sections, the GRS test statistic p-values are always less than 5% leading to strong formal rejections of the models. Additional Generalized Method of Moments, GMM-, based tests also strongly reject. The advantage of the GMM tests is that the results are robust to the realistic features of emerging market data such as non-normality, skewness, heteroscedasticity, and autocorrelations (see for example Harvey, 1995, and Bekaert and Harvey, 1997). Finally, focusing on the size and momentum cross-section, the formal tests have less power relative to the size and B/M cross-sections. In fact, the four-factor model using local factors is not rejected for Asia and the All-Emerging region using GRS or GMM. Moreover, many models survive using US or Global Developed factors. However, the economic performance of the models using US and the Global Developed factors are considerably inferior relative to using local factors.

Throughout the paper, we always work with returns expressed in US dollars. This is a potential issue for our results, which the paper shares with the related literature focusing on asset pricing in developed markets, especially if the purchasing power parity does not hold or if in fact the LHS portfolios considered are correlated with the exchange rate risks (see for example, Solnik, 1974, Dumas and Solnik, 1995).

The paper is organized as follows. Section 2 discusses the methodology, Section 3 describes the data and variables. Section 4 discusses summary statistics for returns and asset pricing tests. Section 5 concludes.

2 Methodology

We evaluate the CAPM, which uses the market return as it's single factor, the Fama and French (1993) three-factor model, and the Carhart (1997) four-factor model.

Capital Asset Pricing Model (CAPM) of Sharpe (1964) and Lintner (1965) is given by,

$$R_{i,t} - RF_t = a_i + b_i[RM_t - RF_t] + e_{i,t}. \tag{1}$$

To capture the cross-section of expected returns in the US stock market associated with size and B/M characteristics, Fama and French (1993) proposes a three factor model,

$$R_{i,t} - RF_t = a_i + b_i[RM_t - RF_t] + s_i SMB_t + h_i HML_t + e_{i,t}. \tag{2}$$

Carhart (1997) four-factor model uses an additional momentum factor in addition to the Fama and French Model.

$$R_{i,t} - RF_t = a_i + b_i[RM_t - RF_t] + s_i SMB_t + h_i HML_t + w_i WML_t + e_{i,t}. \tag{3}$$

In regression equations above, $R_{i,t}$ is the return on portfolio i for month t, RF_t is the risk-free rate, RM_t is the market return, SMB_t is the difference between returns on diversified portfolios of small and big stocks, and HML_t is the difference between the returns on diversified portfolios of high B/M stocks and low B/M stocks. Finally, WML_t is the difference between the returns on diversified portfolios of the winners and losers of the past year.

Following the literature, we use the Gibbons, Ross, and Shanken (1989) test statistic to

evaluate model performance. The statistic is given by;

$$GRS = \left(\frac{T}{N}\right)\left(\frac{T-N-L}{T-L-1}\right)\left[\frac{\hat{a}'\hat{\Sigma}^{-1}\hat{a}}{1+\overline{\mu}'\hat{\Omega}^{-1}\overline{\mu}}\right], \tag{4}$$

where T is the sample size, N is the number of LHS portfolios, L is the number of RHS factors, $\hat{a}$ is a vector of regression intercepts, $\hat{\Sigma}$ is the residual covariance matrix in the sample, and finally $\hat{\Omega}$ is the sample covariance matrix of the RHS factors. The statistic, under the null hypothesis of all regression intercepts are zero, has an F distribution with N and T-N-L degrees of freedom. While convenient to calculate and has an exact distribution in finite sample, the statistic makes the strong assumption that errors are i.i.d. and normally distributed.

To address the concern for non-normal and serially auto-correlated errors, we also use a GMM-based test statistic to evaluate the models. As before, the model parameter point estimates are obtained by running individual OLS (Ordinary Least Squares) regressions Consider the error vector g_T defined by,

$$g_T = 1/T \times \sum_{t=1}^{T} \begin{bmatrix} e_t \\ e_t. \times [RM_t - RF_t] \\ e_t. \times SMB_t \\ e_t. \times HML_t \\ e_t. \times WML_t \end{bmatrix} = 1/T \times \sum_{t=1}^{T} u_t, \tag{5}$$

where e_t denotes the time-t regression errors stacked into an N by 1 vector, $.\times$ denotes the

element by element multiplication, and finally u_t denotes the GMM residuals.

We can construct the jacobian of the error vector, D, where we first differentiate first with respect to the a's (from a_1 to a_N), then similarly the b's, the s's, the h's, and finally the w's. In particular,

$$D = \begin{bmatrix} 1 & \overline{f_{1,t}} & \overline{f_{2,t}} & \overline{f_{3,t}} & \overline{f_{4,t}} \\ \overline{f_{1,t}} & \overline{f_{1,t}^2} & \overline{f_{1,t} \times f_{2,t}} & \overline{f_{1,t} \times f_{3,t}} & \overline{f_{1,t} \times f_{4,t}} \\ \overline{f_{2,t}} & \overline{f_{2,t} \times f_{1,t}} & \overline{f_{2,t}^2} & \overline{f_{2,t} \times f_{3,t}} & \overline{f_{2,t} \times f_{4,t}} \\ \overline{f_{3,t}} & \overline{f_{3,t} \times f_{1,t}} & \overline{f_{3,t} \times f_{2,t}} & \overline{f_{3,t}^2} & \overline{f_{3,t} \times f_{4,t}} \\ \overline{f_{4,t}} & \overline{f_{4,t} \times f_{1,t}} & \overline{f_{4,t} \times f_{2,t}} & \overline{f_{4,t} \times f_{3,t}} & \overline{f_{4,t}^2} \end{bmatrix} \otimes I_{N \times N}, \tag{6}$$

where $f_{1,t}$, $f_{2,t}$, $f_{3,t}$, and $f_{4,t}$ correspond to $[RM_t - RF_t]$, SMB_t, HML_t, and WML_t. $\overline{f_{i,t} \times f_{j,t}}$ is simply the sample mean of $f_{i,t} \times f_{j,t}$. $I_{N \times N}$ denotes an N by N identity matrix and $\otimes$ denotes the kronecker product. Let S denote the spectral density of the residuals, u_t. Then, following the Newey and West (1987) procedure, a sample estimate $\hat{S}$ can be constructed as,

$$\hat{S} = \sum_{j=-k}^{k} \frac{k - |j|}{k} \frac{1}{T} \sum_{t=1}^{T} u_t u_{t-j}', \tag{7}$$

where k is the number of lags after which the errors are assumed uncorrelated. We can then estimate, the covariance matrix of the parameters, V, as follows:

$$V = \left(D' \hat{S}^{-1} D \right)^{-1} / T. \tag{8}$$

We can extract a submatrix, V_a occupying the top left N by N corner of V. Under the null

hypothesis of all regression intercepts are zero, $a'(V_a)^{-1}a$ is distributed chi-squared with N degrees of freedom, which we use as our GMM test-statistic for the linear factor model.

A second use for our GMM framework is to test if the means of two excess return series, $R^e_{m,t}$ and $R^e_{n,t}$ are identical. We apply this test to compare the means of Market $-$ R_f, SMB, HML, and WML strategies across our regions: Asia, Latin America, Eastern Europe, All-Emerging, US, and the Developed Global. The procedure is robust to general patterns of correlation and heteroscedasticity in the data.

Consider an error vector, g_T defined as;

$$g_T = 1/T \times \begin{bmatrix} \sum_{t=1}^{T} R^e_{m,t} - \mu_m \\ \sum_{t=1}^{T} R^e_{n,t} - \mu_n \end{bmatrix}, \tag{9}$$

where μ_m and μ_n are the respective means of $R^e_{m,t}$ and $R^e_{n,t}$. A covariance matrix of the estimates, V, can be constructed by setting D in equation 8 to $-I_{2\times 2}$ and by defining the u_t as $[R^e_{m,t},\ R^e_{n,t}]$', when calculating $\hat{S}$.

3 Data and Variables

Our stock level data for all of the 18 emerging countries we use comes from Datastream. The sample period is from January 1990 to December 2011. All our returns are in U.S. dollars and monthly excess returns are returns in excess of the one-month U.S. Treasury bill rate.[2]

To ensure a reasonable number of stocks in our portfolios, we combine our 18 emerging

[2]See Zhang, (2006) for an explicit incorporation of exchange rate risk into asset pricing tests. The paper evaluates the cross-sectional performance of several international asset pricing models allowing for exchange rate premia in the local returns for the UK, and Japan.

countries into four regions, defined by the MSCI conventions. Our first region is Asia, which includes a total of eight emerging countries: China, India, Indonesia, South Korea, Malaysia, Philippines, Taiwan, and finally, Thailand. The second region is Latin America, which consists of Argentina, Brazil, Chile, Colombia, and Mexico. Our third region is Eastern Europe, which includes Czech Republic, Hungary, Russia, Poland, and Turkey. We consider a fourth region, All-Emerging, which includes all of the 18 emerging countries together. To test for market integration, we also need US and the Global Developed factor and LHS portfolio data, all available from Ken French's website.[3]

Our data appears to provide a comprehensive coverage of the stock universes in these regions. In Table 1, we report that the mean sample size is more than 4000 firms in our Asian sample, close to 800 in our Latin American sample and more than 400 in our Eastern Europe sample The mean firm size is close to $108 million dollars in Asia, $165 million in Latin America, and about $86 million in Eastern Europe. The mean book equity to market equity is about 0.70 regardless of the region. These values are representative for a typical firm because the mean values are taken over the years from 1991 to 2011, whereas each yearly value comes from taking the median of the cross-section of firms.

3.1 Calculation of Asset Pricing Factors

We consider four factors which we use as explanatory variables in our asset pricing regressions. These factors, are the market factor, the SMB (small minus big) factor, the HML (high

[3]US and the Global Developed factor and portfolio data are used in Fama and French (2011). 23 developed countries are included in the Global Developed region: US, Canada, Japan, Australia, New Zealand, Hong Kong, Singapore, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

minus low) factor, and finally the momentum (WML) factor. The US and the Developed Global factors are available from Ken French's website. We calculate the factors regionally for each of Asia, Latin America, and Eastern Europe as well as the All-Emerging region. This requires us to double sort on size and the ratio of book equity and market equity (B/M) or size and momentum. Following the literature, we always use the 6-month lagged value of the B/M ratio to make sure that the accounting information is available to the investor at the time of the portfolio sort. For all the four regions, the market factor is simply the value-weight average of all stock returns in the region. Next, for the four regions, we detail the calculations of SMB, HML, and WML which follows Fama and French (2011) closely.

For each of Asia, Latin America, and Eastern Europe, we form six portfolios to calculate the regional SMB and HML factors. We first classify the largest market capitalization stocks which constitute the 90% of the region's total market cap, as big stocks. All remaining stocks in the region is classified as small stocks. Then, for the big stocks of the region, we determine the usual bottom 30% (growth), middle 40% (neutral), and top 30% (value) breakpoints for B/M and apply these B/M breakpoints to big and small stocks. These classifications allow us to from the six value-weight portfolios SG, SN, SV, BG, BN, and BV, where S and B indicate small or big, and G, N, and V indicate growth, neutral, and value. The size factor, SMB, is the equal-weight average of the returns on the three small stock portfolios minus the average of the returns on the three big stock portfolios. We construct value $-$ growth returns for small and big stocks, $\text{HML}_S = \text{SV} - \text{SG}$ and $\text{HML}_B = \text{BV} - \text{BG}$, and HML is the equal-weight average of HML_S and HML_B.

The calculation of the WML factor is identical to the calculation of the HML factor except

that, the second sort is made not on the stock's B/M but on last year's return (excluding last month). For portfolios formed at the end of month t, the last years return (lagged momentum) is a stock's cumulative return from t-12 to t-2, where the last month is omitted. The intersection of the independent size and lagged momentum sorts result in six value-weight portfolios, SL, SN, SW, BL, BN, and BW, where S and B indicate small or big, and L, N, and W indicate losers, neutral, and winners (bottom 30%, middle 40% and top 30% of lagged momentum). We form winner − loser returns of small and big stocks, WML_S = SW − SL and WML_B = BW − BL, and WML is the equal-weight average of WML_S and WML_B. The reason why the B/M or momentum breakpoints come from the region's big stock universe is to prevent the sorts to be driven by the characteristics of many tiny stocks.

For our last region, All-Emerging, the factors are calculated similarly to the above procedure but, as in Fama and French (2011), with the exception that the B/M or Momentum break points are come regionally to mitigate any effects of differences in accounting rules across the regions. In particular, all stocks of the entire set of 18 countries are sorted across the market capitalization and the largest market capitalization stocks which constitute 90% of the total market capitalization are classified as big stocks. The remaining stocks are small stocks. To classify stocks in to Value, Neutral, or Growth categories, we use the same classification that would result from the procedure described for calculating factors for individual regions; Asia, Latin America and Eastern Europe, above. In particular, focusing on the largest stocks of the region constituting 90% of the regions total market cap, we determine the usual bottom 30% (growth), middle 40% (neutral), and top 30% (value) breakpoints for B/M and apply these B/M breakpoints to all of the region's stocks. Intersecting the size

classification, which is made for all the three regions combined, with the B/M classification that which is made region-specific, allows us to sort the entire universe of emerging stocks in to 6 value-weight portfolios, SG, SN, SV, BG, BN, and BV. These six portfolios are then used to calculate the HML factor for the All-Emerging region. Calculation of the All-Emerging WML factor is identical to the All-Emerging HML factor calculation, except that B/M ratio takes the place of past return.

3.2 Calculation of LHS Returns

We work with 25 portfolios based on 5x5 sorts on size and B/M or size and momentum and use these portfolios as the LHS in our asset pricing tests. These LHS portfolios are calculated for each of the four regions. Following the literature, the B/M sorts are made based on the value of this ratio 6-months before the date of the portfolio sorts. The momentum sorts are based on the cumulative returns between t-12 and t-2 returns.

The calculation of the portfolios follow Fama and French (2011) closely with only a slight modification. The modification is geared towards adapting the procedure they describe for developed markets to the case of emerging markets where the market capitalizations are significantly smaller. Fama and French make sure that for the developed regions they consider, the size breakpoints roughly correspond to the quintile values of NYSE stocks. For emerging markets, the NYSE size quintile values can be simply too large, leaving only a very small number of firms in the top size quintile. For remedy this issue, we adopt a market share based approach.

The objective of this approach is to make sure that each month, our five size groups in

a region, roughly have the same shares of the total regional market capitalization as the US (NYSE, AMEX, and NASDAQ stocks) size groups do based on sorts on the NYSE quintile size break points, as described in Fama and French (1993, 1996). We define our target quintile weights as the monthly market shares of US size quintiles, based on the NYSE size break points.

For each of Asia, Latin America, and Eastern Europe, we sort stocks based on market capitalization, and choose the break points such that the market shares of each size quintile is closest to the month's target quintile weights. Next, based on the big stocks in the region, we calculate the 20, 40, 60, and 80 percentile B/M breakpoints. Big stocks are defined to be the largest market capitalization stocks in the region which constitute a certain share of the total market capitalization in the region. The share is the same as the market share of US stocks larger than the NYSE median in total US market capitalization for that month. The two independent sorts, allow us to place all stocks in the region into one of 25 value-weighted size-B/M portfolios. Calculation of the 25 size-momentum portfolios is identical, except that lagged momentum return takes the place of B/M.

For the All-Emerging region, when forming the size quintiles, we follow the same procedure as the individual regions. In particular, we sort the entire set of stocks in all of the 18 countries based on market capitalization and choose the break points such that the market shares of each size quintile is closest to the month's target quintile weights. However, the B/M and momentum breakpoints are region specific. To calculate region specific B/M breakpoints, calculate the 20%, 40%, 60%, and 80% percentile values of B/M for the largest regional stocks which constitute the a certain share of the regional market. The share is the

same as the market share of US stocks larger than the NYSE median in total US market capitalization for that month. Intersecting the size sorts that come from all 18 countries taken together, and the B/M sorts that are region specific, we place all stocks in the 18 countries into one of the 25 value-weighted size-B/M portfolios. Calculation of the 25 size-momentum portfolios is identical, except that past return takes the place of B/M.

4 Results

4.1 Factor Returns

Table 2 provides the factor means and standard deviations, as well as t-statistics for the means, in emerging markets, US and the Developed Global regions. Focusing on the value effect, looking into the big and small stocks all together, we find a value effect in all of our emerging regions: the HML means are positive and all statistically significant at the 5% level. The monthly effects are 1.03%, 0.66%, and a large 1.88% in Asia, Latin America, and Eastern Europe. All-Emerging region value effect is 1.15%. When considering small and big stocks together, the value effect for US and the Global Developed region, is smaller in magnitude. The HML means are 0.30% and 0.40% per month, with weaker t-statistics of 1.22, and 1.81.

Turning to the value effect calculated for small stocks (HML_S) and big stocks (HML_B) separately, both small and big stock value premia are almost always statistically significant and moreover the values appear similar for all emerging markets. In fact, the t-tests based on the Newey and West (1987) procedure allowing for 6 lags, do not allow us to distinguish

the mean premia across small and big stocks in any of the emerging regions, including the All-Emerging region(t-statistics in Table 2 for HML_{S-B} are insignificant). These results contrast with what we observe in the US and the Global Developed regions. The value premia in US and the Global Developed region are much larger for small stocks and statistically significant. For big stocks, the value premia is small and insignificant. In further support of this result for the value premia point estimates in US and the Global Developed regions, the t-test comparing small and big stock value premia shows that small stock value premia is significantly larger than big stock value premia, with HML_{S-B} t-statistics of 2.79, and 2.59, respectively.

Considering small and big stocks all together, we find a momentum effect for Asia, Latin America, and the All-Emerging region: WML means are positive and statistically significant. We do not find a momentum effect for Eastern Europe: WML mean is insignificant. The mean monthly value of WML is 0.93%, and 0.96% for Asia and Latin America; and a *negative* 0.41% in Eastern Europe.[4]

The momentum effect is strongly present for the All-Emerging region and the monthly mean WML is 0.86%. Turning to US and Global Developed regions, we report monthly values of 0.55% and 0.63% respectively, with t-statistics of 1.57, and 2.16.

We are interested in comparing the momentum effects separately for small and big stocks. For Asia, Latin America, and All-Emerging, small stock momentum premia point estimates are larger than big stocks. And while the small stock premia are significant, large stock

[4]In recent work, Chui, Titman, and Wei (2011) argue that individualism is positively correlated with the magnitude of momentum profits. They find that Turkey (a large part of our Eastern Europe region) is one of the few countries with a negative momentum effect, a finding partly explained by the low value of the individualism index reported for this country.

premia are not. For US and the Global Developed, the same pattern is present: Small stock premia estimates are larger and more significant than big stock premia. In the US, the small stock and big momentum premia are 0.70%, and 0.40%, with t-statistics of 1.81, and 1.17. Turning to the Global Developed, the small and big stock premia are 0.85%, and 0.42%, and the t-statistics are 2.80, and 1.36. For Eastern Europe, momentum average returns are negative, and more so for small stocks. But either premium is indistinguishable from zero. In short, for emerging markets (except Eastern Europe), US or Global Developed, small stock momentum premia tends to drive the results for the broader market. However, despite larger momentum premia point estimates for small stocks, the t-tests do not allow us to distinguish between small and large stock momentum premia: WML_{S-B} t-statistics are insignificant (except for the Global Developed region).

We are interested in the correlations between the factors in a given region. These correlations are important for an investor who is interested in pursuing market, value, and momentum strategies with a geographical focus. The results are given in Table 3. The excess market returns, Market$-\text{R}_f$, and WML are negatively correlated in all of the emerging market regions as well as US and the Developed Global region. Value and momentum are also consistently negatively correlated in any region. Correlations range from -10.10% in Eastern Europe to -26.16% for the All-Emerging region. Asness, Moskowitz, and Pedersen (2009) report negative correlations between the value and momentum returns in the developed equity markets and show that a simple equal-weight portfolio of value and momentum returns has lower volatility and a higher Sharpe ratio relative to value or momentum returns alone. The same conclusion applies to the case of emerging markets. Subfigures 1.a

to 1.c plot the cumulative returns from January 1991 to December 2011 of the Market$-\mathrm{R}_f$, HML and WML, as well as a combination strategy equal-weight in HML and WML, in the All-Emerging region, US, and the Global Developed region. In all cases, the combination strategy seems to offer more steady and higher returns.

Correlations of the factor returns between any two region is an interesting statistic to look at, especially for multi-region portfolios, with a fixed style following market, value, or momentum strategies but in multiple regions. Focusing on the Market$-\mathrm{R}_f$, Panel A of Table 4 the average of the three correlations between Asia, Latin America, and Eastern Europe is 49%. The average of the HML correlations of the three emerging regions is 8%. And finally, the average of the WML correlations is 17%. The low value and momentum factor correlations across the emerging regions offer the potential for multi-region diversification. It is also interesting, especially for an economic agent with holdings of US stocks, to consider emerging market factor correlations with the same factor calculated for the US. For the Market$-\mathrm{R}_f$, the average correlation of Asia, Latin America, and Eastern Europe is 55%, for HML a tiny 1%, and for WML, 27%. The low value and momentum factor correlations with the US can be reasons for internationally diversifying value and momentum strategies.

Finally, we test whether the momentum and value strategy returns are distinguishable across the regions. This exercise is of interest to a style investor choosing the most attractive region to implement a value or a momentum strategy. Panel B of Table 4, fixes an excess return series (either of Market$-\mathrm{R}_f$, SMB, HML, and WML) and reports the t-statistics for distinguishing the means in pairs of regions. Focusing on the HML, at the 5% significance level, Eastern European value effect is statistically larger than Latin America, US, and the

Global Developed region. The All-Emerging region value effect is borderline significantly larger than US and the Global Developed region, with t-statistics of 1.95 and 1.83, respectively. Turning to the momentum, it is not possible to distinguish between any pair of regions. All the t-statistics are insignificant. The importance of this result for momentum is that, while individually rejected for the momentum effect, Eastern Europe in fact might have just as much momentum premia as any of the other regions. Sampling variation is simply too large to tell.[5]

4.2 LHS Portfolios formed on Size and B/M or Size and Momentum

Table 5 reports the means and standard deviations of 25 portfolios formed on size and B/M for Asia, Latin America, Eastern Europe, the All-Emerging region, as well as the US and the Global Developed region. The average return results for the 25 portfolios detail the results found for the HML in subsection 4.1 and Table 2. For all of the emerging regions, the value effect is present for all of the five size groups considered: extreme value stocks have higher mean returns than extreme growth stocks.[6] This result corroborates with the positive and statistically significant HML means for all regions. A second result is that the magnitudes of the value premia appear pretty similar across the size groups of a region. For example, the value premia in Asia is 2.12% (1.80%+0.32%) for the smallest size group and 1.39% (1.23%+0.16%) for the biggest. In the All-Emerging region, the value premia are 1.56% (1.87%-0.31%) and 1.58% (1.45%+0.13%) for the smallest and the biggest size groups.

[5]Return variances are high in emerging markets, making the same result true for Market$-\mathrm{R}_f$ and SMB (small minus big) factors. In particular, Panel B of Table 4 shows that it is not possible to statistically distinguish between average market return in excess of the US T-bill return across any pair of regions. Moreover, the excess return of small stocks over and above large stocks, SMB, is also indistinguishable across any pair of regions.

[6]The only one exception is for Latin America's fourth largest size group.

The similar value premia result for small and big stocks explain the insignificant t-statistics for HML_{S-B} reported in Table 2 and, indeed, contrasts with the results reported for US and the Global Developed region reported in the same table. Because, for the US and the Global Developed region, HML_{S-B} are positive and statistically significant.[7] Finally, all of the emerging market returns have higher volatilities than the US or the Developed Global. Particularly striking is the ballpark volatility of the Eastern European portfolios of around 15%, relative to around 5% to 10% for US and 5% to 6% for the Developed Global region.

Table 6 reports the means and standard deviations of 25 portfolios formed on size and momentum. The average return results clearly show the presence of momentum in Asia, Latin America, and the All-Emerging region: Extreme high momentum portfolios have higher means than extreme low momentum portfolios across all size groups.[8] This result explains the positive and statistically significant WML means reported in Section 4.1. For Eastern Europe, often *low* momentum portfolios have higher means, which explains why the WML mean for Eastern Europe is insignificant and negative in Table 2. It appears that higher momentum premia is typical for small stocks. For example, in Asia, the momentum premia is 0.86% (1.74%−0.88%) and 0.52% (0.62%−0.10%) for the smallest and biggest size groups. In Latin America, the momentum premia are 1.41% and 0.04% for the smallest and biggest size groups. In the All-Emerging region, the numbers are 0.50% and 0.40%. The larger momentum premia finding for the small stocks in emerging markets corroborates with the momentum premia results for the developed markets reported in Fama and French (2011).

[7] Fama and French (1993, 2011), Kothari, Shanken, and Sloan (1995), and Loughran (1995) find larger value premia for small stocks at least for the US.

[8] The only exceptions are the third and the fourth size groups in Latin America.

4.3 Asset Pricing Tests

4.3.1 Size and B/M Cross-Sections

Table 7 reports the results of asset pricing regressions 1, 2, and 3 where the LHS portfolios are the 25 portfolios formed on the basis of size and B/M. We use four sets of LHS portfolios using the stocks in Asia, Latin America, Eastern Europe, and the All-Emerging region. As our RHS factors, we use local, US and the Global Developed factors. We calculate the local factors as described in Section 3.1, US and the Global Developed factors are available from Ken French's website. Comparing US or Global Developed factors with local factor results allows us to comment on the integration of local emerging markets with the global capital markets. We report the GRS test statistic and the associated p-values (1 minus the cumulative distribution function value) for testing if all the regression intercepts are zero. To account for possible autocorrelations and heteroscedasticity, we also report the p-values associated with our GMM based test statistic which we construct to test the same hypothesis. In our GMM procedure, we allow error term autocorrelations up to 6 months. Additionally, we report the average of the absolute values of regression intercepts, the average of the intercept standard errors (calculated using the Newey and West (1987) procedure with 6 lags) as well as the average regression R^2s. We refer to $SR(a) \equiv \hat{a}'\hat{\Sigma}^{-1}\hat{a}$ as the unexplained squared Sharpe ratio and report it in Table 7. Larger values of $SR(a)$ indicate poorer economic performance of the model.[9]

GRS statistic rejects all models, CAPM, the three-factor, and the four-factor, when the

[9]Gibbons, Ross, and Shanken (1989) show that $SR(a)$ is the difference between the squared Sharpe ratios of the maximum Sharpe ratio portfolio constructed using the LHS and RHS returns together, and the maximum Sharpe ratio portfolio constructed using the RHS returns only. Lewellen, Nagel, and Shanken (2008) suggest using confidence intervals for $SR(a)$ as a more intuitive measure of model performance.

25 portfolios sorted on size and B/M are the LHS portfolios. Models are rejected regardless of the region or whether local, US or Global Developed factors are used. The GRS p-values are always less than 3% percent which simply highlight that the B/M sorted portfolios are a challenge for asset pricing in emerging markets. The rejections are slightly weaker when using the local factors, relative to the US and the Global Developed factors.

From a statistical perspective, the models with local factors perform slightly better than US or Global Developed factors. From an economic perspective however, using the local factors leads to drastically better performance, while still rejected statistically. To understand this result, we can compare, the average absolute value of regression intercepts |a|, regression R^2s, intercept standard deviations, s(a), and finally the model unexplained squared Sharpe ratios, SR(a), across the models. Using local factors, the average model intercepts are much lower, R^2s a lot higher, intercept standard deviations a lot lower, and finally SR(a)'s are a lot lower than using US or the Global Developed factors. The intuition for this economic result is the same as the slightly weaker econometric result in the previous paragraph: emerging equity markets lack a degree of integration with the US or Global Developed capital markets.[10] We also find two additional intuitive results: First, that the three-factor model seems to improve the model performance significantly over and above the CAPM as evidenced by

[10]Other papers which characterize the lack of complete integration include, Bekaert and Harvey (1995) which proposes a measure of capital market integration using a conditional regime-switching model. The measure is calculated for a total of twelve emerging markets as well as developed markets. The paper finds a reasonable amount of segmentation particulary for emerging markets. The sample period is from 1970 to 1992 for most countries. Chambet and Gibson (2006) focus on emerging markets and explore financial integration though a multivariate GARCH(1,1)-M return generating model and conclude that emerging markets still remain to a large extent segmented. The sample period is from 1995 to 2004. Carrieri, Vihang, and Hogan (2007) explore a somewhat similar specification to assess the evolution of market integration in emerging markets from 1977 to 2000 and conclude that while local risks are still prevalent, none of the emerging markets appear completely segmented. Moreover, they find that emerging markets become more integrated through time, despite some episodic reversals. Bekaert and Harvey (2002, 2003) provide an extensive survey of the emerging markets finance literature, including the literature on integration. Bekaert, Harvey, and Lumsdaine (2002) explores structural breaks in a number of financial and macroeconomic variables in emerging markets, and show that breaks are often dated after the official announcements of financial market reforms.

lower intercepts, higher R^2s, lower intercept standard errors, and finally lower SR(a)'s. And second, for the size and B/M cross-section, the four-factor model does not seem to improve much over and above the three-factor model. The economic performances across the two models are very close. These two points make us conclude that the three-factor model is the best suited model for explaining the size and B/M cross-section. In general, for a given region and a set of RHS factors (local, US or the Global Developed), the GRS statistics for the three-factor model is the lowest which supports the better economic performance of the model.

There is a sizeable literature exploring stock return statistics in emerging markets which document autocorrelation, heteroscedasticity, and predictability characteristics (see for example Harvey, 1995 and Bekaert and Harvey, 1997).[11] In the light of all of these results, it is useful to consider the results of a GMM based test which is robust to potential serial autocorrelations, heteroscedasticity, and non-normality in the data. The GMM statistic is described in Section 2 and is geared towards testing if all regression intercepts are jointly zero in the regression equations 1, 2, or 3.

Focusing on the GMM based statistic allowing for serial correlations up to 6-months, we continue to reject all models, regardless of the region and regardless of whether local, US or Global Developed factors are used, at the 5% significance level. This finding shows that

[11] Harvey (1995) reports that emerging market returns have positive and large monthly autocorrelations, whereas the autocorrelations are much closer to zero in the developed markets. Bekaert and Harvey (1997) study the time variation of volatility in emerging markets. They present the results of GARCH models exploring whether the cross-sectional dispersion in volatility is related to a number of macroeconomic and microstructure variables as well as measures related to financial integration. Both papers report GMM results which almost always reject the normality assumption for emerging equity returns. In related work, Bekaert, Erb, Harvey, and Viskanta (1998, a) study the evolution of emerging stock market volatilities and find substantial time variation during the 80s and 90s. Bekaert (1995) provides evidence for emerging market return predictability using variables such as lagged local dividend yield and excess market return using data from 1985 to 1992. Bekaert, Erb, Harvey, and Viskanta (1998, b) explore the implications of non-normal emerging market returns for asset allocation in a portfolio choice model.

the rejections using the GRS test statistic are robust to relaxing the restrictive assumptions. However, with GMM it is no longer true that the local factor models always lead to weaker rejections than US or Global Developed factors. For example, for the All-Emerging region, the p-value is 5% using US factors, and 2% using local factors. However, moving to US factors from local, the improvements are minor, and certainly does not make up for the great loss of economic performance. While the GMM results presented in this paragraph highlight that the econometric conclusions about relative factor performance can be sensitive to the assumptions that go into the procedure, the economic results strongly favor local factors.

4.3.2 Size and Momentum Cross-Sections

Table 8 reports the same set of results as in Table 7, but for the 25 LHS portfolios formed on the basis of size and momentum. The rejections for the size and momentum sorts are significantly weaker than the rejections for the size and B/M sorts. To see this, recall that for the size and B/M cross-sections all cases are unanimously rejected using the GRS test. However, as an example, the four-factor model survives when using local factors for Asia and the All-Emerging region at the 5% significance level. The reason is that, almost always, the value effect point estimates are than the momentum effect, for all of the emerging regions: HML means are larger than the WML, except for Latin America, as reported in Table 2.

The four-factor model seems to perform the best from both econometric and economic perspectives. First, the GRS test statistics are significantly lower for the four-factor model relative to the three-factor model or the CAPM, especially when local factors are used. Second, the economic measures of performance are almost always better for the four-factor

model compared to the CAPM or the three-factor model: Average intercepts are lower, R^2's are higher, intercept standard errors, s(a)'s, are lower, and finally, unexplained squared Sharpe ratios are lower.

Local factors, appear to outperform, in the economic sense, using US and Global Developed factors, similar to the case of size and B/M LHS portfolio results given in the previous section. All economic measures are almost always appreciably better using local factors. This finding reinforces the lack of integration between the emerging markets and US or the developed markets. From an econometric perspective, counterintuitively, using US or Global Developed factors can lead to weaker rejections than using local factors, but the results never translate to a better economic fit.

Turning to the GMM results, which allow for more realistic features of the return data, the tests have a lot less power, and as a consequence many cases pass. In fact, the four-factor model using local factors is not rejected for any of the emerging regions. And often even cases with US or Global Developed factors fail to be rejected. This finding simply highlights that econometric rejections of models can be sensitive to the return assumptions one is willing to make.

5 Conclusion

Emerging stock markets are clearly a significant part of the world portfolio today and therefore are important to the average investor. Finance literature has discovered important facts about size, value, and momentum effects in US, as well as in the developed equity markets. Size, value, and momentum effects are a lot less explored for emerging markets. This paper

presents results to fill this gap by considering stock returns in four emerging regions: Asia, Latin America, Eastern Europe, as well as the All-Emerging region which is three regions considered all together.

The paper has two main contributions: First, we explore the size patterns in value and momentum returns. Second, we form 25 portfolios based on size and B/M and size and lagged momentum for emerging markets, and use these portfolios as the LHS returns in asset pricing regressions. The asset pricing regressions use the CAPM, the three-factor model, and the four-factor model. We allow the factors to be calculated using local, US or Developed Global stock markets data.

We find a value effect in all four of our emerging regions for the broader markets including small and big stocks together. In all of the four regions, big stock value premia point estimates are slightly larger than small stock value premia and both premia are individually statistically significant. The t-test for the equality of the small and big value premia fails to reject. This size pattern in emerging market value premia, contrasts with results we find for the US or Global Developed markets.

We also find a momentum effect in all four of our emerging regions for the broader markets including small and big stocks, except for Eastern Europe where we find no momentum. Turning to the size patterns in momentum, small stock momentum premia point estimates are larger than big stock premia. Moreover, small stock momentum premia are individually significant, whereas the big stock premia are not. These results show that emerging market momentum effects are largely driven by small stocks. Momentum effects that decrease with size is a finding consistent with momentum results found for the developed markets.

The literature for developed markets has highlighted that momentum and value returns are negatively correlated which has implications for long-run portfolio management. We confirm the same finding for emerging markets: An important point since emerging market volatilities are higher and combining negatively correlated value and momentum returns help reduce this volatility.

Turning to the asset pricing tests, models using US or Developed Global factors to explain local returns disappoint. A degree of market segmentation remains which makes the economic performance of local factor models so much better relative to US of Developed Global factors. We find this result despite a positive trend for integration over the last few decades which the literature documents. The cross-sections based on size and BM are easily rejected even when using local factors. However, for the B/M and momentum sorts, the local four-factor models often fail to reject.

For future research, it would be interesting to see whether liquidity characteristics can shed some light on the emerging value and momentum returns. Some pioneering work has already been done by Lesmond (2005) and Bekaert, Harvey, and Lundblad (2007) but no analysis of the relationship between value and momentum returns with liquidity has been provided.

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Table 1. Firm Characteristics in Asia, Latin America, and Eastern Europe Emerging Markets. The table provides the mean values (across the years in our sample) of annual size and book equity to market equity ratios (B/M), as well as the number of firms for Asia, Latin America, and Eastern Europe in our Datastream sample. Countries in each region are given in Section 3 of the paper. The sample period is from January 1990 to December 2011. The first momentum sort absorbs a year of data, so the mean values are reported across the years from 1991 to 2011. Annual values are the median of the monthly values in that year.

	Size	B/M	number of firms
	Asia		
Mean	107.86	0.75	4238.76
	Latin America		
Mean	164.98	0.71	779.10
	Eastern Europe		
Mean	85.68	0.75	435.95

Table 2. Means, Standard Deviations, and the t-statistics for Explanatory Asset Pricing Factors. The table reports the percent means and standard deviations (Std. Dev.) of the asset pricing factors calculated for the emerging regions, as well as US and the Global Developed region. Emerging regions are Asia, Latin America, Eastern Europe, and finally the All-Emerging region, all three emerging regions together. This paper calculates the emerging region factor returns using stock level data from Datastream, whereas factors for US and the Global Developed region are available from Ken French's website. Countries in each region are given in Section 3 of the paper. All returns are converted into US dollars before forming the portfolios. Market-R_f is the return on the value weighted market minus the US one month T-bill rate. SMB is the small minus big factor, HML is the high minus low factor, WML is the momentum factor. S and B stand for small stocks and big stocks: for example HML_S is the high minus low factor for small stocks. In addition, HML_{S-B} simply refers to the $HML_S - HML_B$. The same definition applies to WML_{S-B}. The factor calculations are detailed in Section 3.1 of the paper. The table also reports the $t-$statistics (t-stat.) calculated for the means using the Newey and West (1987) procedure allowing up to 6-lags. Data period is from January 1991 to December 2011.

	Market-R_f	SMB	HML	HML_S	HML_B	HML_{S-B}	WML	WML_S	WML_B	WML_{S-B}
					Asia					
Mean	0.40	0.42	1.03	1.04	1.03	0.01	0.93	1.01	0.85	0.15
Std. Dev.	6.50	3.31	5.74	6.85	5.78	5.36	6.52	7.55	6.61	5.62
t-stat.	0.75	1.98	2.55	2.12	2.63	0.03	2.00	1.98	1.76	0.44
					Latin America					
Mean	1.02	0.43	0.66	0.48	0.83	-0.34	0.96	1.17	0.75	0.42
Std. Dev.	7.72	4.40	4.36	4.52	6.59	7.18	6.12	6.19	8.27	7.99
t-stat.	1.66	1.84	2.16	1.63	1.79	-0.70	2.07	2.27	1.40	0.84
					Eastern Europe					
Mean	1.27	0.24	1.88	1.76	2.01	-0.25	-0.25	-0.41	-0.10	-0.32
Std. Dev.	12.47	6.47	8.25	10.61	10.42	13.04	9.78	11.16	12.17	12.77
t-stat.	1.48	0.63	3.60	2.83	3.03	-0.34	-0.38	-0.55	-0.12	-0.39
					All-Emerging					
Mean	0.49	0.28	1.15	1.06	1.23	-0.16	0.86	0.98	0.74	0.24
Std. Dev.	6.28	3.06	4.87	5.71	5.35	5.25	5.55	6.54	5.98	5.81
t-stat.	0.97	1.33	3.13	2.54	3.17	-0.47	2.02	2.06	1.63	0.65
					US					
Mean	0.57	0.28	0.30	0.57	0.03	0.55	0.55	0.70	0.40	0.30
Std. Dev.	4.51	3.46	3.32	3.84	3.41	2.93	5.23	5.40	5.51	3.12
t-stat.	1.81	1.48	1.22	2.05	0.11	2.79	1.57	1.81	1.17	1.36
					Global Developed					
Mean	0.39	0.09	0.40	0.62	0.18	0.44	0.63	0.85	0.42	0.43
Std. Dev.	4.43	2.15	2.43	2.72	2.69	2.38	4.15	4.03	4.62	2.51
t-stat.	1.23	0.68	1.81	2.51	0.79	2.59	2.16	2.80	1.36	2.58

Table 3. Correlations between Market-R_f, SMB, HML, and WML Factors in the Same Region: Emerging, US or the Global Developed. The table reports the correlations between the Market-R_f, SMB, HML, and WML asset pricing factors in the same emerging region, US or the Global Developed region. Emerging regions are Asia, Latin America, Eastern Europe, and finally the All-Emerging region, all three emerging regions together. This paper calculates the emerging region factor returns using stock level data from Datastream, whereas factors for US and the Global Developed region are available from Ken French's website. Countries in each region are given in Section 3 of the paper. All returns are converted into US dollars before forming the portfolios. Market-R_f is the return on the value weighted market minus the US one month T-bill rate. SMB is the small minus big factor, HML is the high minus low factor, WML is the momentum factor. The factor calculations are detailed in Section 3.1 of the paper. Data period is from January 1991 to December 2011.

	SMB	HML	WML	SMB	HML	WML
	Asia			Latin		
Market$-R_f$	0.02	0.15	-0.11	-0.42	0.01	-0.19
SMB		-0.19	-0.35		-0.12	0.18
HML			-0.24			-0.20
	Eastern Europe			All-Emerging		
Market$-R_f$	-0.35	-0.07	-0.18	-0.20	0.20	-0.15
SMB		-0.07	-0.05		-0.15	-0.21
HML			-0.10			-0.26
	US			Global Developed		
Market$-R_f$	0.24	-0.24	-0.25	-0.01	-0.15	-0.22
SMB		-0.34	0.08		-0.19	0.18
HML			-0.15			-0.25

Table 4. Correlations between the Same Factor but in Different Regions and t-statistics for Testing if the Same Factor has Different Means in Different Regions. Panel A reports the correlations of the same factor but in different regions: Emerging, US and the Developed Global region. Panel B reports the t-statistics for testing if the same factor has different means in any two regions. In Panel B, the t-statistics are for the mean of the region indicated in the row heading minus the mean of the region indicated in the column heading. Factors are the Market$-$R$-f$, SMB, HML, and WML. Emerging regions are Asia, Latin America, Eastern Europe, and finally the All-Emerging region, all three emerging regions together. Market-R$_f$ is the return on the value weighted market minus the US one month T-bill rate. SMB is the small minus big factor, HML is the high minus low factor, WML is the momentum factor. This paper calculates the emerging region factor returns using stock level data from Datastream, whereas factors for US and the Global Developed region are available from Ken French's website. Countries in each region are given in Section 3 of the paper. The factor calculations are detailed in Section 3.1 of the paper. Data period is from January 1991 to December 2011.

Panel A: Correlations of Factor Returns across Regions

	Latin America	Eastern Europe	All-Emerging	US	Global Developed	Latin America	Eastern Europe	All-Emerging	US	Global Developed
	Market$-$R$_f$					SMB				
Asia	0.62	0.42	0.94	0.56	0.61	0.16	0.04	0.83	0.00	0.15
Latin America		0.43	0.83	0.66	0.65		0.21	0.49	-0.09	0.10
Eastern Europe			0.53	0.44	0.48			0.22	-0.02	0.03
All-Emerging				0.67	0.70				-0.04	0.13
US					0.92					0.76
	HML					WML				
Asia	0.10	0.12	0.90	0.01	0.03	0.16	0.14	0.92	0.28	0.30
Latin America		0.02	0.36	-0.02	0.03		0.21	0.45	0.26	0.29
Eastern Europe			0.25	0.04	0.12			0.28	0.28	0.32
All-Emerging				0.04	0.08				0.34	0.37
US					0.87					0.91

Panel B: t-statistics Testing if Factor Means are Equal in Two regions: Row Minus Column

	Latin America	Eastern Europe	All-Emerging	US	Global Developed	Latin America	Eastern Europe	All-Emerging	US	Global Developed
	Market$-$R$_f$					SMB				
Asia	-1.23	-1.31	-0.48	-0.35	0.00	-0.04	0.66	1.18	0.51	1.44
Latin America		-0.37	1.70	0.93	1.28		0.65	0.61	0.57	1.52
Eastern Europe			1.15	1.03	1.33			-0.42	-0.36	0.12
All-Emerging				-0.17	0.25				-0.02	0.85
US					1.47					1.28
	HML					WML				
Asia	0.89	-1.32	-0.81	1.55	1.41	-0.05	1.04	0.35	0.88	0.73
Latin America		-2.13	-1.55	0.86	0.68		1.14	0.29	0.81	0.66
Eastern Europe			1.46	2.77	2.87			-1.23	-0.58	-0.75
All-Emerging				1.95	1.83				0.76	0.59
US					-0.75					-0.63

Table 5. Means and Standard Deviations of Left Hand Side (LHS) 25 Portfolios Formed on Size and B/M. The table reports the means and the standard deviations of 25 portfolios formed on size and the book equity to market equity ratios (B/M) for the emerging regions as well the US and the Global Developed region. Emerging regions are Asia, Latin America, Eastern Europe, and finally the All-Emerging region, all three emerging regions together. Firms are sorted into five size groups, from Small to Big, based on market capitalization. Firms are also sorted into five B/M groups, from Low to High, based on the book equity to market equity ratio. We intersect the two sorts and value weight to obtain 25 portfolios. Section 3.2 of the paper details the portfolio formation procedure. This paper calculates the emerging region portfolio returns using stock level data from Datastream, whereas portfolio returns for US and the Global Developed region are available from Ken French's website. Countries in each region are given in Section 3 of the paper. All returns are converted into US dollars before forming the portfolios. Data period is from January 1991 to December 2011.

	Mean					Standard Deviation				
	Low	2	3	4	High	Low	2	3	4	High
					Asia					
Small	-0.32	0.61	0.26	0.84	1.80	9.41	9.98	8.54	8.10	8.11
2	-0.33	0.31	0.74	0.82	1.44	9.82	9.65	8.30	7.93	8.61
3	0.10	0.66	0.61	0.74	1.17	8.33	8.09	7.99	7.92	8.42
4	0.13	0.18	0.50	0.54	0.88	7.36	7.67	7.39	7.39	8.64
Big	-0.16	0.05	0.30	0.56	1.23	6.82	6.99	6.97	6.93	8.89
					Latin America					
Small	1.30	0.67	0.77	1.10	2.28	8.24	7.02	6.97	6.72	7.89
2	1.37	0.88	0.56	1.37	2.80	9.78	8.42	7.62	10.47	11.11
3	1.13	0.68	1.19	1.09	2.04	9.40	8.32	7.41	8.00	7.93
4	1.64	0.90	1.07	1.14	1.19	10.04	8.17	7.52	8.57	7.81
Big	-0.06	0.81	0.90	1.48	1.77	13.11	8.76	8.50	9.04	9.98
					Eastern Europe					
Small	-0.44	1.30	2.27	2.69	3.02	14.33	15.60	15.90	15.95	12.80
2	1.10	0.69	1.17	2.35	1.92	13.84	16.25	13.97	16.39	12.46
3	0.49	0.46	0.47	1.40	1.69	12.73	13.50	12.86	14.43	13.14
4	0.49	1.44	0.20	0.86	2.64	14.19	14.24	12.38	13.96	14.55
Big	0.49	0.78	0.57	1.55	2.98	16.01	14.56	15.22	14.86	16.55
					All-Emerging					
Small	0.31	0.41	0.77	1.05	1.87	7.49	7.27	7.80	7.31	7.31
2	0.47	0.68	0.76	0.80	1.54	8.07	7.22	7.33	7.19	7.68
3	0.45	0.40	0.52	0.67	1.21	7.15	7.03	7.04	6.98	7.68
4	0.30	0.21	0.66	0.62	1.23	6.66	6.93	6.82	6.90	7.88
Big	-0.13	0.31	0.39	0.62	1.45	6.56	6.72	6.87	7.14	8.37
					US					
Small	0.35	1.05	1.18	1.27	1.30	9.27	7.84	6.33	5.93	6.51
2	0.67	0.94	1.12	1.01	1.04	7.94	6.28	5.72	5.83	6.72
3	0.60	0.97	1.07	0.96	1.31	7.37	5.83	5.38	5.55	5.79
4	0.89	0.96	0.87	1.05	0.82	6.62	5.45	5.66	5.33	5.90
Big	0.68	0.80	0.70	0.63	0.54	4.91	4.59	4.94	4.93	5.74
					Developed Global					
Small	0.36	0.67	0.94	1.02	1.31	5.93	5.51	5.13	4.67	4.41
2	0.34	0.65	0.80	0.87	0.99	5.86	5.25	4.73	4.46	4.57
3	0.49	0.61	0.75	0.82	0.96	5.75	5.24	4.69	4.48	4.69
4	0.63	0.65	0.75	0.83	0.91	5.65	4.66	4.56	4.52	4.84
Big	0.54	0.60	0.71	0.76	0.68	4.62	4.33	4.52	4.55	5.48

Table 6. Means and Standard Deviations of Left Hand Side (LHS) 25 Portfolios Formed on Size and Momentum. The table reports the means and the standard deviations of 25 portfolios formed on size and lagged momentum for the emerging regions as well the US and the Global Developed region. Emerging regions are Asia, Latin America, Eastern Europe, and finally the All-Emerging region, all three emerging regions together. Firms are sorted into five size groups, from Small to Big, based on market capitalization. Firms are also sorted into five momentum groups, from Low to High, based on last year's cumulative return excluding the last month. We intersect the two sorts and value weight to obtain 25 portfolios. Section 3.2 of the paper details the portfolio formation procedure. This paper calculates the emerging region portfolio returns using stock level data from Datastream, whereas portfolio returns for US and the Global Developed region are available from Ken French's website. Countries in each region are given in Section 3 of the paper. All returns are converted into US dollars before forming the portfolios. Data period is from January 1991 to December 2011.

	Mean					Standard Deviation				
	Low	2	3	4	High	Low	2	3	4	High
					Asia					
Small	0.88	1.06	1.32	1.56	1.74	9.22	6.71	6.51	7.03	8.68
2	0.50	0.58	1.13	1.51	1.45	9.74	7.14	6.71	7.26	8.99
3	0.22	0.32	0.82	1.11	1.18	9.33	7.02	6.72	7.11	8.82
4	0.09	-0.07	0.46	0.84	1.10	9.38	6.91	6.42	6.92	8.27
Big	0.10	-0.10	0.11	0.46	0.62	8.90	6.99	6.41	6.56	8.11
					Latin America					
Small	0.14	0.64	1.36	1.57	1.55	9.79	6.77	6.99	7.24	6.67
2	-1.16	0.39	0.94	0.78	0.38	11.73	7.60	7.07	9.86	7.67
3	0.17	0.37	0.24	0.87	-0.04	17.99	11.63	7.53	7.31	10.80
4	0.95	0.02	0.37	0.35	0.90	13.85	11.02	8.66	11.43	13.19
Big	-0.23	-0.63	0.01	-0.14	-0.19	11.04	11.82	9.35	11.73	10.52
					Eastern Europe					
Small	2.10	1.89	2.01	2.96	1.76	11.92	12.00	14.09	14.82	12.00
2	0.93	1.51	1.45	1.89	1.22	10.66	12.26	14.33	13.97	11.71
3	1.02	1.35	1.54	1.87	2.03	12.34	12.21	13.55	13.38	12.33
4	1.00	0.52	0.70	1.13	0.61	11.93	13.91	13.69	13.40	12.81
Big	1.47	0.33	0.27	0.88	0.72	13.71	16.74	14.05	14.01	12.33
					All-Emerging					
Small	1.09	0.98	1.23	1.68	1.59	8.88	6.73	6.35	6.26	7.19
2	0.50	0.77	1.15	1.31	1.69	8.72	6.75	6.44	6.88	7.85
3	0.17	0.37	0.80	1.11	1.34	8.65	6.73	6.35	6.54	7.52
4	0.01	0.27	0.50	0.88	1.27	8.27	6.85	6.23	6.42	7.31
Big	0.45	-0.06	0.33	0.63	0.85	8.36	6.70	6.75	6.45	7.37
					US					
Small	0.62	1.04	1.23	1.49	1.86	9.04	5.77	5.03	5.08	6.88
2	0.79	1.07	1.19	1.31	1.55	9.04	6.11	5.05	5.12	7.06
3	0.92	0.98	1.11	1.13	1.37	8.51	5.67	4.92	4.76	6.49
4	0.68	1.02	1.08	1.08	1.23	8.65	5.62	4.65	4.39	5.93
Big	0.50	0.82	0.74	0.95	1.04	7.78	5.26	4.22	4.10	5.19
					Developed Global					
Small	0.35	0.87	1.00	1.35	1.74	6.45	4.40	3.99	4.11	5.49
2	0.34	0.71	0.77	1.00	1.31	6.72	4.67	4.21	4.24	5.60
3	0.46	0.69	0.79	0.83	1.07	6.68	4.93	4.28	4.21	5.57
4	0.45	0.68	0.75	0.81	1.12	6.62	4.79	4.23	4.27	5.40
Big	0.33	0.55	0.63	0.76	0.83	6.29	4.60	4.13	4.24	5.42

Table 7. Regression Summary Statistics of 25 LHS portfolios formed on Size and B/M. The table reports the regression results for the CAPM, three-factor, and the four-factor models. LHS is the 25 portfolios formed on Size and B/M in emerging regions, US and the Global Developed region. Emerging regions are Asia, Latin America, Eastern Europe, and finally the All-Emerging region, all three emerging regions together. RHS is the asset pricing factors calculated using local, US or Developed Global stock markets data. GRS and GMM test statistics are described in Section 3. cdf refers to the cumulative distribution function. |a| and R^2 refer to the average absolute value of regression intercepts and R^2s. Finally, s(a) and SR(a) refer to the average regression intercept standard deviations and the unexplained squared Sharpe ratio. These variables are detailed in Section 4.3.1. Data period is from January 1991 to December 2011.

	GRS	GRS-cdf	GMM-cdf	|a|	R^2	s(a)	SR(a)	GRS	GRS-cdf	GMM-cdf	|a|	R^2	s(a)	SR(a)
	Local Factors							US Factors						
	Asia							Asia						
CAPM	3.05	1.00	1.00	0.41	0.68	0.29	0.58	3.00	1.00	1.00	0.38	0.20	0.47	0.58
Three-Factor	2.85	1.00	1.00	0.31	0.83	0.25	0.56	2.79	1.00	1.00	0.34	0.20	0.46	0.56
Four-Factor	2.83	1.00	1.00	0.33	0.83	0.25	0.56	2.77	1.00	1.00	0.43	0.22	0.46	0.56
	Latin America							Latin America						
CAPM	2.07	1.00	1.00	0.49	0.55	0.38	0.48	2.11	1.00	1.00	0.72	0.25	0.49	0.48
Three-Factor	1.67	0.97	0.98	0.32	0.66	0.31	0.43	2.01	1.00	0.97	0.60	0.26	0.49	0.47
Four-Factor	1.88	0.99	1.00	0.34	0.66	0.32	0.46	2.13	1.00	0.99	0.64	0.26	0.50	0.49
	Eastern Europe													
CAPM	2.29	1.00	1.00	0.80	0.49	0.66	0.50	2.27	1.00	1.00	0.83	0.14	0.85	0.50
Three-Factor	1.73	0.98	1.00	0.53	0.59	0.59	0.44	2.21	1.00	1.00	0.82	0.13	0.87	0.50
Four-Factor	1.80	0.99	0.99	0.55	0.60	0.58	0.45	2.23	1.00	1.00	0.90	0.14	0.88	0.50
	All-Emerging							All-Emerging						
CAPM	2.22	1.00	0.98	0.34	0.69	0.25	0.49	2.22	1.00	0.98	0.34	0.29	0.39	0.50
Three-Factor	1.63	0.97	0.98	0.18	0.84	0.18	0.42	2.08	1.00	0.95	0.31	0.29	0.39	0.48
Four-Factor	1.79	0.99	0.99	0.17	0.84	0.18	0.44	2.22	1.00	0.99	0.41	0.31	0.39	0.50
	Global Developed Factors													
	Asia													
CAPM	2.98	1.00	1.00	0.41	0.23	0.45	0.57							
Three-Factor	2.71	1.00	1.00	0.36	0.27	0.43	0.55							
Four-Factor	2.75	1.00	1.00	0.51	0.29	0.44	0.55							
	Latin America													
CAPM	2.18	1.00	1.00	0.86	0.26	0.48	0.49							
Three-Factor	2.12	1.00	0.96	0.74	0.27	0.49	0.48							
Four-Factor	2.29	1.00	0.97	0.76	0.27	0.50	0.50							
	Eastern Europe													
CAPM	2.31	1.00	1.00	0.91	0.15	0.84	0.51							
Three-Factor	2.26	1.00	0.99	0.95	0.16	0.86	0.50							
Four-Factor	2.38	1.00	0.99	1.11	0.16	0.88	0.51							
	All-Emerging													
CAPM	2.21	1.00	0.99	0.39	0.32	0.38	0.49							
Three-Factor	1.99	1.00	0.96	0.34	0.36	0.36	0.47							
Four-Factor	2.32	1.00	1.00	0.49	0.38	0.37	0.51							

Table 8. Regression Summary Statistics of 25 LHS portfolios formed on Size and Momentum. The table reports the regression results for the CAPM, three-factor, and the four-factor models. LHS is the 25 portfolios formed on Size and lagged momentum in emerging regions, US and the Global Developed region. Emerging regions are Asia, Latin America, Eastern Europe, and finally the All-Emerging region, all three emerging regions together. RHS is the asset pricing factors calculated using local, US or Developed Global stock markets data. GRS and GMM test statistics are described in Section 3. cdf refers to the cumulative distribution function. |a| and R^2 refer to the average absolute value of regression intercepts and R^2s. Finally, s(a) and SR(a) refer to the average regression intercept standard deviations and the unexplained squared Sharpe ratio. These variables are detailed in Section 4.3.1. Data period is from January 1991 to December 2011.

	GRS	GRS-cdf	GMM-cdf	|a|	R^2	s(a)	SR(a)	GRS	GRS-cdf	GMM-cdf	|a|	R^2	s(a)	SR(a)
	Local Factors							US Factors						
	Asia							Asia						
CAPM	1.61	0.96	0.92	0.56	0.63	0.30	0.42	1.43	0.91	0.81	0.54	0.18	0.43	0.40
Three-Factor	1.44	0.91	0.83	0.61	0.70	0.28	0.40	1.26	0.81	0.81	0.52	0.19	0.44	0.38
Four-Factor	1.04	0.58	0.77	0.17	0.78	0.25	0.34	1.30	0.84	0.83	0.55	0.21	0.43	0.38
	Latin America							Latin America						
CAPM	1.96	0.99	0.91	0.62	0.34	0.48	0.47	1.87	0.99	0.90	0.55	0.17	0.50	0.46
Three-Factor	1.91	0.99	1.00	0.68	0.37	0.50	0.46	1.77	0.98	0.95	0.53	0.17	0.52	0.44
Four-Factor	1.70	0.98	0.93	0.59	0.39	0.50	0.44	1.72	0.98	0.97	0.51	0.18	0.51	0.44
	Eastern Europe							Eastern Europe						
CAPM	1.58	0.96	0.95	0.60	0.58	0.56	0.42	1.36	0.88	0.40	0.79	0.13	0.77	0.39
Three-Factor	1.62	0.96	0.95	0.48	0.66	0.52	0.42	1.29	0.83	0.31	0.70	0.13	0.79	0.38
Four-Factor	1.60	0.96	0.93	0.48	0.66	0.52	0.42	1.42	0.90	0.57	0.81	0.14	0.79	0.40
	All-Emerging							All-Emerging						
CAPM	2.18	1.00	1.00	0.53	0.69	0.25	0.49	2.01	1.00	1.00	0.53	0.27	0.38	0.47
Three-Factor	1.99	1.00	0.99	0.54	0.78	0.23	0.47	1.89	0.99	1.00	0.50	0.28	0.38	0.46
Four-Factor	1.30	0.84	0.64	0.15	0.84	0.20	0.38	1.88	0.99	1.00	0.51	0.30	0.38	0.46
	Global Developed Factors													
	Asia													
CAPM	1.44	0.91	0.81	0.58	0.22	0.42	0.40							
Three-Factor	1.30	0.84	0.77	0.57	0.28	0.42	0.38							
Four-Factor	1.37	0.88	0.78	0.60	0.30	0.42	0.39							
	Latin America													
CAPM	1.87	0.99	0.84	0.51	0.19	0.46	0.45							
Three-Factor	1.80	0.99	0.92	0.49	0.20	0.48	0.45							
Four-Factor	1.86	0.99	0.98	0.50	0.20	0.49	0.45							
	Eastern Europe													
CAPM	1.41	0.90	0.42	0.91	0.15	0.76	0.40							
Three-Factor	1.30	0.84	0.34	0.85	0.15	0.78	0.38							
Four-Factor	1.54	0.95	0.60	1.02	0.15	0.80	0.41							
	All-Emerging													
CAPM	2.05	1.00	1.00	0.57	0.32	0.36	0.48							
Three-Factor	1.96	0.99	1.00	0.53	0.36	0.36	0.47							
Four-Factor	1.95	0.99	1.00	0.56	0.37	0.37	0.46							

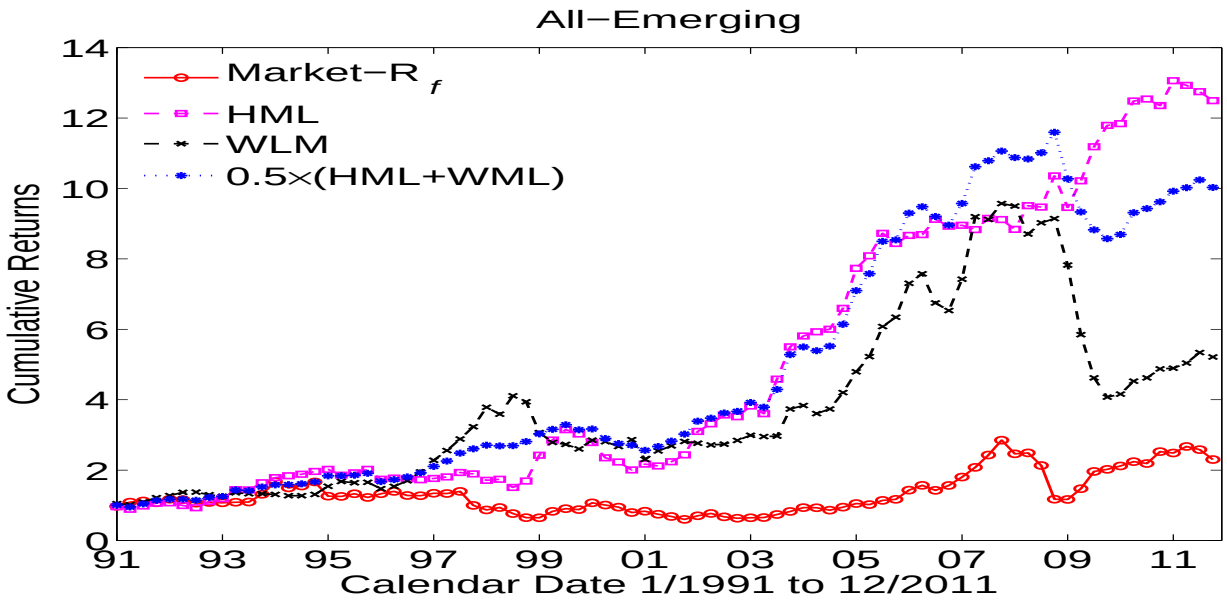

Figure 1.a. All-Emerging

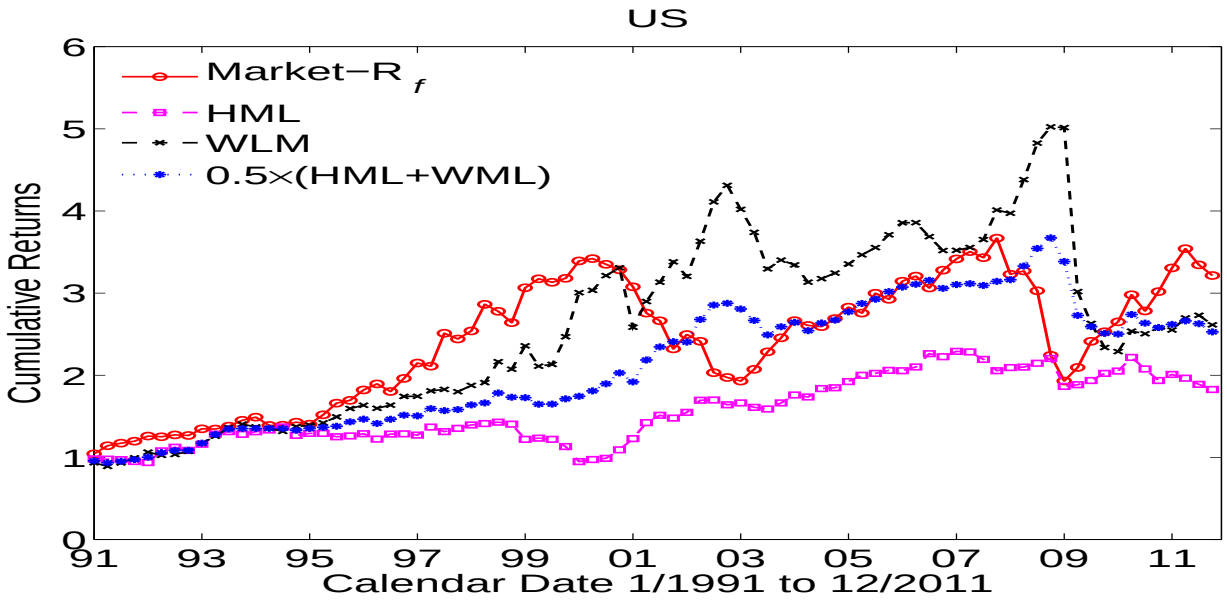

Figure 1.b. US

Figure 1. Cumulative Factor Returns. The subfigures 1.a to 1.c plot the cumulative returns of the asset pricing factors calculated for the All-Emerging region, US, as well as the Global Developed region. The All-Emerging region consists of Asia, Latin America, and Eastern Europe emerging regions all together. The factors are Market-R$_f$, HML and WML. Market-R$_f$ is the return on the value weighted market minus the US one month T-bill rate. HML is the high minus low factor, WML is the momentum factor. We also consider a combination strategy equal-weight in HML and WML: 0.5×(HML+WML). This paper calculates the All-emerging region factor returns using stock level data from Datastream, whereas factors for US and the Global Developed region are available from Ken French's website. Countries in each region are given in Section 3 of the paper. All returns are converted into US dollars before forming the portfolios. The factor calculations are detailed in Section 3.1 of the paper. Data period is from January 1991 to December 2011.

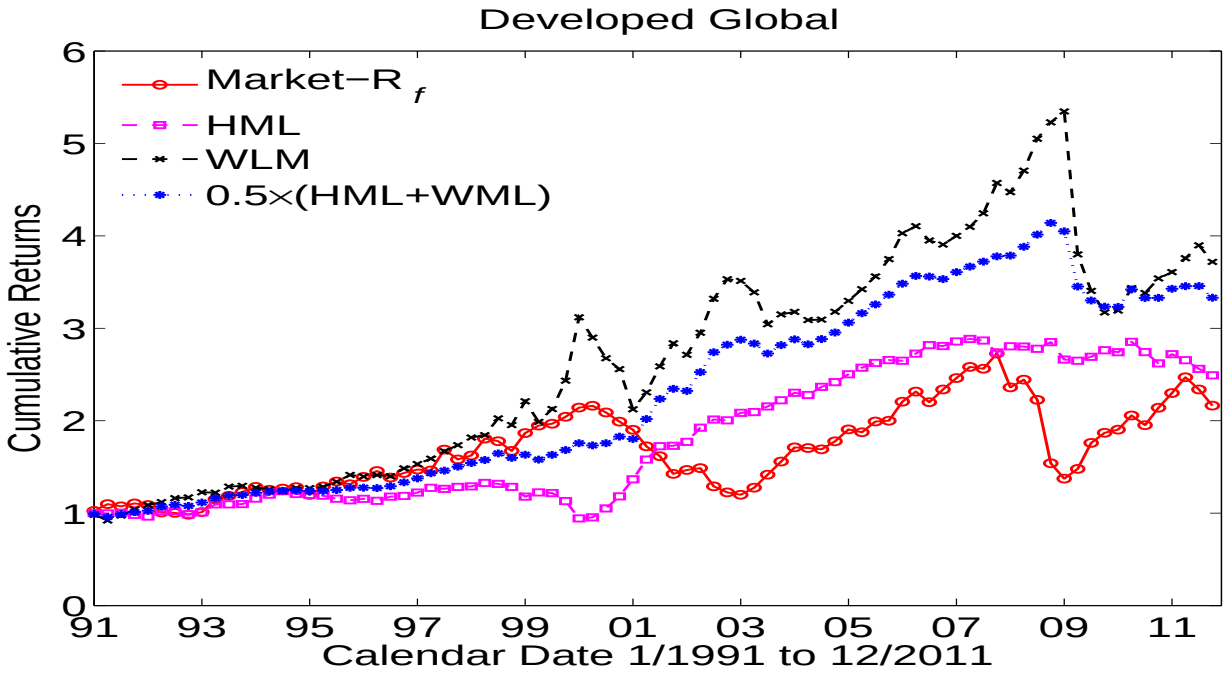

Figure 1.c. Developed Global