Risk Exposure of Country Mutual Funds across Bull and Bear Markets

This Version: September, 2014

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Abstract:
This paper examines whether country mutual funds respond differently to the up– and down-side conditions in its underlying risk factors, namely, return on the US market, the foreign benchmark and the foreign exchange market. Our sample includes 15 CEFs and 19 ETFs that are traded in the US financial markets and designed to mimic performances of certain foreign country benchmarks. Using a 3–factor pricing model, we run pooled regressions on the full sample as well as four subsamples. Empirical results obtained from a number of explorative regression specifications indicate that country funds respond differently to the up– and down–phases for the mainly US market returns. Moreover, the downside beta for the US market is found to be greater in magnitude than the upside beta. On the other hand, the country funds returns seem to have a single beta for each of the other two risk factors. A possible explanation is presented based on the relationship between the country funds and the up– and down–phases in the US market. The findings of the paper have important implications for investors with regards to their effort to diversify across borders and to design optimal asset allocation.

Keywords: Country Mutual Funds, Bull and Bear Conditions, Dual Beta Models, Closed end funds; Exchange traded funds; International diversification

1. Introduction and Motivations

Both exchange-traded funds (ETFs) and closed-end funds (CEFs) are professionally managed portfolios traded like individual stocks. ETFs are the only potential substitutes for CEFs with respect to their trading characteristics and also within certain narrow investment sectors (Barnhart and Rosenstein, 2010). In addition, World Equity Benchmark (WEB) funds (also called iShares) is created, which enabled the US investors investing in foreign assets, which have limited exposures to US market risks. Each iShare is an optimized portfolio combining assets from a foreign country and tracks the underlying Morgan Stanley Capital International (MSCI) index in a foreign country. Consequently, both foreign country market risk and home country market (the market where the security is traded, for example, US market) risk affect the prices of iShares (Zhong and Yang, 2005).

The main objective of the paper is to investigate the extent of benchmark risk exposure of country funds (Closed-end funds and Exchange-traded funds) in response to the different risk exposures in the domestic market and the foreign exchange market. This study assumes U.S. market as the home country market or domestic market and the foreign market refers to the market where the stocks are originated and issued. A number of studies have examined the diversification benefits of country funds (Miffre, 2007; Patro, 2005; Pennathur et al., 2002; Detzler and Wiggins, 1997; Cumby and Glen, 1990; Bailey and Lim, 1992; Chang et al., 1995 and Arshanapalli et al., 1996). Another strand of studies have scrutinized the downside and upside risk exposure of country funds (Galsband, 2012; Matheu and Mccurdy, 2000; Woodward and Anderson, 2009 and Ang et al, 2006). However, still a number of questions remain unanswered. For example, is foreign market a significant risk factor in providing international diversification benefits from the country mutual funds? Are the country mutual funds more sensitive to foreign market movements or movements in the U.S. market? How do U.S. risk exposures affect returns and diversification benefits of country mutual funds? How do conditions in foreign exchange market influence country mutual funds? We attempt to address these issues in this paper.

Changing domestic market conditions influence beta to change in domestic market and the same happens in international market. In line with this theory, empirical studies have argued that the

benefit of portfolio diversification would be lower when investors form portfolios only with domestic assets as domestic asset returns would be highly positively correlated owing to the influence of similar systematic risk factors in the same economy. Theoretically, most of the investors in the market are risk-averse, who expect to receive compensation for higher level of risk. Hence, investors would be demanding higher premium in a bear market condition when there is high chance of losing capital. Any asset would be an unattractive one to a rational investor if the asset's return tends to decline more in a bear market condition than rise in a bull market condition since the average payoffs of the asset tends to be low when the investor has low wealth. Investors who are more sensitive to downside losses than to upside gains, require a premium for holding assets which are highly correlated with the market when the market declines. Hence, in an economy with agents placing greater emphasis on downside risk than upside gains, assets with high sensitivities to downside market movements have higher average returns (Ang et al., 2006). Therefore, equity beta seems to change due to the changes in market conditions (bull and bear) both domestically and internationally. Earlier studies by Bawa and Lindenberg (1977) and Harlow and Rao (1989) also contributed to the development of the theory that allows for beta to vary over market conditions.

Empirically many studies have investigated the issue of changing beta in differing market conditions. Studies by Fabozzi and Francis (1977), Kim and Zumwalt (1979) and Clinebell et al. (1993) have examined whether beta of individual securities vary in bull and bear market conditions. The same question was investigated by Fabozzi and Francis (1979) and Kao et al. (1998) for mutual funds. A few other studies investigated the same issue for size based portfolios (Wiggins, 1992, Bhardwaj and Brooks, 1993, and Howton and Peterson, 1998). Findings from these studies are mixed and inconclusive. Moreover, these studies mostly investigated the issue in developed markets in general and US market in particular. Debate towards whether beta varies in bull (up) and bear (down) markets for individual stocks, mutual funds and portfolios lasts for decades (Fabozzi and Francis, 1977, 1979; Wiggin, 1992; Howton and Peterson, 1998; Pettengill, Sundaram, Mathur, 1995, 2002). Through investigation of individual securities and mutual funds separately, Fabozzi and Francis (1977, 1979) find that the beta is not affected by different market conditions, which are defined in

three different ways[1]. Pettengill, Sundaram, Mathur (1995) find significant relationship between return and betas in both bull and bear market but fail to prove that size and BE/ME can be risk factors for return in either up or down markets (Pettengill, Sundaram, Mathur, 2002). Embrechts et al. (1997) indicate that the influences from bull and bear markets are more obvious in the developing countries due to the cyclical financial crisis (Bekaert and Harvey, 2000). Furthermore, Pagan and Sossounov (2003) identified the bull and bear markets through a random walk analysis rather than constructing a statistical model as adopted by most studies (Maheu and McCurdy, 2000; Woodward and Anderson, 2009; Cunado, Gil-Alana and Gracia, 2010). Different voices can be heard from Kim and Zumwalt (1979), who cannot find significantly different stock performance in bull and bear markets. A number of studies, which take fundamental and non-fundamental components of iShares' risk exposures into account, have investigated the differing risk premium of iShares' attributed to the differing market conditions in both the foreign (home) market and the host market (the US market) (Delcoure and Zhong, 2007; Zhong, Darrat and Anderson, 2003 and Zhong and Yang, 2005). However, a few studies find that influence of direct US market risk exposure is weaker, less significant and less prevalent in iShare pricing. These studies further argue that a strong majority of country iShares do not behave significantly differently from their underlying market indices (Phengpis and Swanson, 2009 and Tsai and Swanson, 2009). Additionally, country specific sentiment and country popularity affect pricing of country funds (Hwang, 2011).

Theoretical consensus with conflicting and inconclusive empirical findings of the earlier studies motivated us to investigate the extent of benchmark risk exposure of country funds in response to the different conditions in the domestic market and the foreign exchange markets. We estimate a 3-factor pricing model applying pooling approach and Generalized Methods of Moments (GMM) on weekly returns of a sample of 15 country CEFs and 19 ETFs over the period of January, 2001 to December, 2012, a total of 12 years.

Our contribution to the literature is twofold. *First*, we document the using a comprehensive data (both developed and emerging markets) to investigate the impact on returns of country funds (CEFs

[1] Bull and Bear, Up and Down, Substantial Up and Down Months.

and ETFs) due to bull and bear market conditions both in home market (U.S. market) and foreign markets. *Second*, unlike the earlier studies, we test and explain how and why returns of country funds respond bringing different market conditions (bull and bear conditions) in both home and foreign markets in a single model.

Findings of our study can be summarized as follows. *First*, the foreign market has been identified as the most important and significant risk factor for both ETFs and closed-end country funds in full sample and subsamples, providing compelling evidence of international diversification benefits from the country mutual funds. *Second*, both ETFs and CEFs are found to be more sensitive to foreign market movements than to U.S. market movements. *Third*, the foreign exchange market accounts for the country mutual fund returns, even though the magnitude is very small. *Fourth*, significant bull and bear market betas based on U.S. market have been found out from the full, CEF and emerging market samples. And the significance remains valid even when the issue is examined simultaneously in all three markets in the same specification. *Fifth*, the country funds respond more to the bear market condition than to the bull market conditions due to the higher down-market beta than up-market beta in the U.S. market. *Finally*, the difference between the bear and bull market betas in the foreign exchange market is not significant in any of the specifications. Therefore, we conclude that the only market movement to which the country mutual fund returns respond differently for the bull and bear markets is the U.S. market.

The paper is organized as follows. The data and methodology are discussed in section 2. We report results and analysis of the study in section 3. Finally, the paper wraps up with concluding remarks in section 4.

2. Data and Methodology

2.1 Data

This paper employs weekly data for a sample of 15 country CEFs and 19 ETFs over the period of January, 2001 to December, 2012, a total of 12 years. Weekly data are used to avoid day of the week effect and the

problem of non–synchronous trading between the US and overseas markets. The long time series of each fund including the recent crisis periods that will enable us to study their long term behavior separately across different economic states, which may be the underlying reason for time varying risk exposure. The names of countries with their ETFs and CEFs are listed below.

- ***Developed Markets***
    - ETF: Australia, Austria, Belgium, Canada, France, Germany, Hong Kong, Italy, Japan, Netherlands, Singapore, Spain, Sweden, Switzerland, United Kingdom
    - CEF: Australia, Germany, Ireland, Japan, Singapore, Switzerland
- ***Emerging Markets***
    - ETF: Brazil, Malaysia, Mexico, South Korea
    - CEF: India, Indonesia, China, Chile, Mexico, South Korea, Taiwan, Thailand, Turkey

2.2 Methodology

We begin with the following benchmark three factor pricing regression[2]

$$R_t = \alpha + \beta_D\, R_{Dt} + \beta_F\, R_{Ft} + \beta_X\, R_{Xt} + e_{it} \quad (1)$$

where, R_t is returns on any country mutual fund, $R_{D,t}$ is returns on the domestic or the US market, R_{Ft} is returns on the benchmark foreign market and R_{Xt} is returns on the foreign exchange market with foreign exchange rate is defined the value of a foreign currency (i.e. currency of the benchmark country) per unit of domestic of US dollar. All observations are in weekly frequency and expressed net of one–month US Treasury Bill yield. The coefficients β_D, β_F and β_X are domestic, foreign and foreign exchange market betas, respectively and α is the intercept. While the expected signs on β_D and β_F are positive, the expected sign on β_X is negative. The negative expected sign on β_X signifies an inverse relationship between depreciation of foreign currency relative to the US dollar and decrease in the returns on the country funds.

[2] For the relevant literature on the international asset pricing models, refer to Bekaert and Harvey (1997), Pennathur et al. (2002), Zhong and Yang (2005) and Zhang (2006).

A particular concern is the correlation between the US market and the certain foreign benchmark market. The high correlation between returns on these two markets would introduce bias in the estimation. In order to avoid this problem, we first orthogonalize the US market return with respect to the foreign market return by specifying the following regression,

$$R_{Dt} = a + b\, R_{Ft} + u_t \tag{2}$$

where, u_t is the error term. The orthogonalized US market return, denoted as $\ddot{R}_{Dt}$, is then defined as the estimated residuals from equation (2), i.e. $\ddot{R}_{Dt} = \hat{u}_t$. With this newly obtained orthogonalized US market returns, the 3–factor pricing model becomes,

$$R_t = \alpha + \beta_D\, \ddot{R}_{Dt} + \beta_F\, R_{Ft} + \beta_X\, R_{Xt} + e_t \tag{3}$$

where, R_{Dt} is replaced with $\ddot{R}_{Dt}$, and all other variables are as explained above[3].

Bull and Bear Market Conditions and the Beta Coefficient

In order to examine whether country fund returns respond differently to the downside movements in the US market, the following 3–factor pricing regression can be specified[4] as,

$$R_t = \alpha + \beta_D^+ \ddot{R}_{Dt}^+ + \beta_D^- \ddot{R}_{Dt}^- + \beta_F\, R_{Ft} + \beta_X\, R_{Xt} + e_t \tag{4}$$

where, $\ddot{R}_{Dt}^+ \equiv Max(\ddot{R}_{Dt}, 0)$ and $\ddot{R}_{Dt}^- \equiv Min(\ddot{R}_{Dt}, 0)$ are positive and negative returns on the domestic markets, respectively. Also, the slope coefficients are defined as $\beta_D^+ = Cov\left(R_{t,}\ddot{R}_{Dt}^+\right)/Var\left(\ddot{R}_{Dt}^+\right)$ and $\beta_D^- = Cov\left(R_{t,}\ddot{R}_{Dt}^-\right)/Var\left(\ddot{R}_{Dt}^-\right)$.

An alternative specification for the upside and downside market is used to ensure robustness of our findings. Following Bawa and Lindenberg (1977) and Ang, Chen and Xing (2006), we specify as $\ddot{R}_{Dt}^+ \equiv Max(\ddot{R}_{Dt}, \mu_m)$ and $\ddot{R}_{Dt}^+ \equiv Min(\ddot{R}_{Dt}, \mu_m)$, where, μ_m is the average excess returns on the US market.

Denoting the difference between the upside and downside market betas as $\delta_D = \beta_D^- - \beta_D^+$, and rearranging the equation (4), we obtain the following specification[5]

[3] Similar methodologies are outlined in Zhong and Yang (2005) and Phengpis and Swanson (2009).
[4] Similar framework has been discussed in Lo (2001) and Ang, Chen, and Xing (2006) to capture upside and downside movement in a financial market.

$$R_t = \alpha + \beta_D \ddot{R}_{Dt} + \delta_D \ddot{R}^-_{Dt} + \beta_F R_{Ft} + \beta_X R_{Xt} + e_t \quad (5)$$

A significant δ_D^- would indicate that bull and bear market movements in the US market affects the returns asymmetrically, the test can be specified as $H_o: \delta_D = 0$ which is equivalent to $H_o: \beta^- = \beta^+$.

In the similar spirit as shown above, the next question is to ask if the downside movements of the benchmark foreign market have any impact on the fund returns which is different from that of the upside market. The following regression is specified to address this issue,

$$R_t = \alpha + \beta_D \ddot{R}_{Dt} + \beta_F R_{Ft} + \delta_F R^-_{Ft} + \beta_X R_{Xt} + e_t \quad (6)$$

where, $R^-_{Ft} = Min(R_{Ft}, 0)$, and all other variables are as defined before, and δ_F is the estimated coefficient. A significant δ_F would indicate that downside movement in the foreign market affects the returns which are not captured by the estimated coefficient β_F, which can tested under the null hypothesis of $H_o: \delta_F = 0$

We also investigate whether the bull and bear conditions in the foreign exchange markets have any impact on the returns on the country funds. The specification is now,

$$R_t = \alpha + \beta_D \ddot{R}_{Dt} + \beta_F R_{Ft} + \beta_X R_{Xt} + \delta_X R^-_{Xt} + e_t \quad (7)$$

Rejection of the null hypothesis, $H_o: \delta_X = 0$ would indicate that there is differential influence of bull and bear condition in the foreign exchange market. Finally, we combine all of three specifications above and run the following regression to examine the impact of different market conditions on country funds' return.

$$R_t = \alpha + \beta_D \ddot{R}_{Dt} + \delta_D \ddot{R}^-_{Dt} + \beta_F R_{Ft} + \delta_F R^-_{Ft} + \beta_X R_{Xt} + \delta_X R^-_{Xt} + e_t \quad (8)$$

where, all variables are as defined before.

2.3. Estimation Methodology

Estimation of 3–Factor Models

The 3–factor pricing model for country mutual funds is estimated by pooling the data.

[5] See appendix for additional details.

Consider the following system of regression equations which jointly make up an unconditional two–factor model for country mutual funds,

$$R_{Dt} = a + b\, R_{Ft} + u_t \tag{9}$$

$$R_t = \alpha + \beta_D\, \ddot{R}_{Dt} + \beta_F\, R_{Ft} + \beta_X\, R_{Xt} + e_t \tag{10}$$

where, R_{it} is return on any fund, R_{Dt} is return on the domestic or the US market, (e.g. S&P 500), R_{Ft} is return on the foreign market (i.e. MSCI Index). v_t and e_{it} are regression error terms. In order to remove correlation between the US and foreign market, we run regression (9) and save the residuals to form: $\ddot{R}_{Dt} = \hat{u}_t$, which is the orthogonalized US market excess returns. The orthogonalized US market excess return is then used as one of the regressors in equation (10) which is a two–factor pricing model for country mutual funds.

Since one of the RHS variables in (10) is the residual from (9), estimates from (10) will suffer from measurement error. In addition, if any parameter uncertainty exists in (9), this will also enter (10). The error terms in the above regressions may be correlated causing the endogeneity problem to arise. To avoid these problems, we estimate equations (9) and (10) together using Generalized Methods of Moments (GMM). We specify the set of moment conditions associated with equations (9) and (10):

$$E[\, R_{Dt} - a - b\, R_{Ft}]\, X_t' = 0' \tag{11}$$

$$E\big[R_t - \alpha - \beta_D\, \ddot{R}_{Dt} - \beta_F\, R_{Ft} - \beta_X\, R_{Xt}\big]\, Y_t' = 0' \tag{12}$$

where, $X_t' \equiv [1, R_{Ft+1}]'$ $Y_t' \equiv [1,\ \ddot{R}_{Dt}, R_{Ft}, R_{X,it}]'$ are the set of instrumentals used to form the orthogonality conditions. For each of the asset, there are (2+4=) 6 moment conditions including the intercept terms and 6 parameters to be estimated. The system is therefore exactly identified.

3. Results and Analysis

Table 2 presents the descriptive statistics for the weekly returns of the country closed end funds (CFEs) for the developed markets in Panel A and the emerging markets in Panel B. On average, the returns are slightly higher for emerging market funds than for developed market funds. However, the volatility of returns, as measured by their standard deviation, is generally lower for closed-end funds tracking the developed markets, ranging between 2.99% (Switzerland) to 4.69% (Ireland). For emerging market funds,

this range is between 4.09% (Mexico) to 6.79% (Russia). The Jerque–Bera (JB) normality test indicates that all returns series are non–normally distributed.

Table 2 also shows correlation of the excess returns on the domestic or US market returns (i.e. S&P 500 index) and the foreign market returns. The high correlation (ranging between 38.3% to 77.5%) between the domestic and foreign market returns, $\rho_{US,F}$, indicates that including both domestic and foreign market returns would give us incorrect, usually excess, magnitude of funds' sensitivity to the domestic market. The relevant literature recognizes this issue and recommends orthogonalizing the US market returns before using the series as a regressor (Taylor, 2005; Phengpis and Swanson, 2009)[6]. The correlation of the excess returns on each mutual fund with the domestic or US market returns after orthogonalization (ranging between 7.7% and 31.0%) substantially drops compared to that before orthogonalization. As expected, funds are also highly correlated with the foreign market returns, ρ_F, whose performance they are designed to track. Finally, the returns series are also highly autocorrected (ρ_{auto}), indicating high persistence in them.

In Table 3, we present the descriptive statistics for the weekly returns of the country exchange traded mutual funds (ETFs), where developed markets in Panel A and the emerging markets in Panel B. Average weekly returns are positive for some of the funds while negative for some others. Magnitude of volatility in returns for different funds ranges between 2.87% (Switzerland) and 5.31% per week (Brazil). All funds have negative autocorrelation which are also very small. Correlations between returns on the funds and the underlying benchmarks in the foreign market are very high in all cases. Returns correlation with the US market is also high before orthogonalization ranging between 0.51 (Malaysia) and 0.847 (UK). But, given the fact that the US market movement is highly correlated with the foreign markets, as can be seen in the second last column, it is appropriate to orthogonalize the US market returns with respect to the foreign market returns. The last column reports correlation of funds' returns with orthogonalized US market returns. The values of the correlation coefficient are smaller, ranging between 2.7% (Canada) and 26.2% (Italy). The rest of the empirical investigation is done with the orthogonalized US market data.

[6]The orthogonalized US returns are the estimated residuals from a regression of the US return series on a foreign market return series, and discussed in Section 3.

The correlation structures among returns on mutual funds, domestic market and corresponding foreign markets provide an indication of diversification potential with closed-end country mutual funds. Errunza et al. (1999) show that US investors can achieve international diversification by holding assets traded domestically introducing the idea of a diversification portfolio, which has high correlation with a target foreign market. Investing a diversification portfolio, composed of such locally traded but internationally oriented securities as country closed-end funds and American depository receipts (ADR), can exhaust the benefits of direct foreign investment. Given that the closed-end funds we consider here have high correlation with their respective foreign markets, as shown in Tables 2 and 3, each fund has the potential of being a diversification asset. Moreover, these funds have very low correlation (using the orthogonalized data) with the domestic markets movements which make them even more suitable to be part of a diversification portfolio.

Table 4 presents the benchmark 3–factor pricing regression results. Several observations can be made based on Table 4. First, alpha is negative and significant in the full sample and all sub samples. This may indicate that the funds do not generate abnormal returns. Second, all three risk factors are significant. The coefficients on the US and foreign market risk factors are positive and significant for all samples. On the other hand, the coefficients on the foreign exchange risk factor are all significant and negative as expected. These signs are similar to the results reported in Tsai and Swanson (2009).

As it emerges from Table 4, the most relevant risk factor for the country funds is the underlying foreign market benchmark. The magnitude of β_F is the largest of all factors and close to unity in many cases ranging 0.863 (full sample) to 0.909 (ETF sample). Also, the US market returns seems to be a relevant risk factor, although the magnitude of β_D is generally small ranging between 0.338 (ETF sample) and 0.512 (CEF sample). The country funds' exposure to the US market may be due to investor sentiment or segmented market phenomenon.

Next, we move to examine how the bull and bear market conditions affect the returns on country mutual funds. First, we estimate three different specifications, given in equations 5 through 7, allowing for only one of the three risk factors having separate bull and bear market returns as the explanatory variables. In

these specifications, return on the other two risk factors is not separated to account for bull and bear conditions. The results are presented in tables 5 through 7.

Table 5 presents the estimation results of equation 5, where the coefficient, δ_D, estimates the impact of the bull and bear market return differential in the US on the left hand side variable. In Panel A, the bull and bear markets are defined with respect to whether the returns are positive or negative. The parameter of interest is δ_D which is significant in the full sample and also in CEF and emerging market subsamples, but not in the ETF and developed market. In Panel B, the bull and bear markets are defined with respect to the average sample return. The results are similar to that of Panel A with the size of the coefficients are now smaller. The findings are thus robust to alternative definition of bull and bear markets. An interesting point to note is the sign of the coefficient δ_D. Given the original definition, i.e. $\delta_D \equiv \beta_D^- - \beta_D^+$, a positive sign of δ_D indicates $\beta_D^- > \beta_D^+$, or the country funds react more to bear market return than to bull market return in the US market. The results in the full sample may be dominated by the CEF and funds targeting the emerging market benchmarks.

The estimation results of equation 6 are reported in Table 6, where the impact of the bull and bear market conditions in the foreign benchmark country is examined. As can be seen in Panel A, the coefficient δ_F is positive and significant in the full sample. The size of the coefficient (0.074) is much smaller than δ_D for the full sample (0.148) reported in Table 5. This means that the impact of different market conditions in the US market on country funds returns is much greater than similar conditions in the foreign market. Also, given the positive sign of the coefficient, defined as $\delta_F \equiv \beta_F^- - \beta_F^+$, the impact of down market on the funds return is higher than the up market, i.e. $\beta_F^- > \beta_F^+$, which is the same as in the US market reported in the previous table. As for the subsamples, δ_F is significant for the CEF and developed market and insignificant for ETF and emerging market subsamples. Similar results are obtained in Panel B, where an alternative definition of bull and bear markets is used, reinforcing the results in Panel A.

In table 7, we present the estimation results of equation 7 where the impact of the bull and bear market conditions in the foreign exchange market on the country funds returns are examined. The parameter of interest is now δ_X which is insignificant in the full sample and in all subsamples as can be seen in both

Panel A and B. In our data, the country funds' response to the downside foreign exchange market is not separate from their response to the upside market. A possible reason for this finding is that the returns in our sample are all expressed in US dollar, so that up and down market changes in the foreign exchange markets are not reflected in the funds returns.

Having analyzed the impact of different market conditions on the country funds' return, we now estimate equation 8, in which all three markets are simultaneously examined. The estimation results are presented in Table 8 which can be compared with Tables 5 through 7 where up – and downside risk factors were examined separately. As can be seen, δ_D is significant in the full, CEF and emerging market samples, as found earlier in the model reported in Table 5. But, δ_D is not significant in ETF and the developing market sample. On the other hand, δ_F and δ_X are not significant in any sample. Together, the results in this table shows that the only market which has differential impact on country fund return for the up– and downside is the US market as represented by the S&P 500 index. A possible explanation for the significance of downside beta may be based on how the funds are linked to the US market. These funds may be linked to the US market either through investor sentiment (Bodurtha, Kim and Lee, 1995; Lee and Hong, 2002) or thorough segmented market phenomenon. This may be truer for the CEFs than ETFs as the later are found to be efficiently replicating their benchmark (Tsai and Swanson, 2009).

Another important finding in this table is that the coefficient on the foreign exchange market risk factor, β_X, is no longer significant indicating that returns on the foreign exchange market is not a priced factor. In the benchmark model, this was a priced factor. Zhong and Yang (2005) report that this factor is mostly insignificant for a sample of country ETFs.

What does explain our results? There can be a number of investors and market characteristics that can explain the findings of this paper. First, correlation between the US and the foreign market increases more during the bear phase than during the bull phase giving rise to possible differential level of risk exposure of the country funds to the US market movement (Longin and Solnik, 2001; Butler and Joaquin,

2002). This reduces the diversification opportunities for the US investors. The US investors realize this reduced diversification opportunity and attempt to reallocate the assets in their portfolio.

Second, since the relationship of country funds to the US market is primarily due to reasons related to investor sentiment (Lee and Hong, 2002), rather than asset fundamentals, the risk exposure for the US market as measured by the US beta reacts differently during the bull and the bear phase. This does not happen to the foreign beta, as the relationship between the country funds and the foreign market is based more on fundamentals than on sentiments.

Third, contrary to the expectation, the US investors tilt their portfolio towards their home market during the bear phase than the bull one displaying higher degree of home bias during bear market than the bull market (Campbell and Kräussl, 2007). This causes the bear market US beta to be higher than the bull market as observed in our sample.

The findings of the paper have a number of implications. Diversification opportunities for the US investors during the bull and the bear phase. During the down phase of the US market, the risk exposure of the country funds to the US market goes up resulting in higher correlation between them. This increased risk exposure to the US market also lower diversification benefits for the US investors. It is important to note that the US investors would need divarication benefits more during the down phase in the US market than the up phase. Ironically, the diversification potential decreases when it is most needed

4. Concluding Remarks

The objective of the paper is to examine whether country mutual funds respond differently to the up– and downside conditions in its underlying risk factors. The sample includes 15 CEFs and 19 ETFs that are designed to mimic foreign country benchmarks. Using a 3–factor pricing model, we run pooled regressions on the full sample as well as four subsamples. Empirical results obtained from a number of explorative regression specifications can be summarized as follows. First, the foreign market has been found the most important and significant risk factor for the country mutual funds. The foreign market beta for the ETF sample has been found to be greater in magnitude as compared to the CEF sample. Similarly, developing sample has higher foreign market beta than emerging market sample. Second, for

the country mutual funds the US market movement has been found to a significant source of risk, albeit smaller in magnitude when compared to the foreign market movement. Possible explanations of significance of US market risk factor include investor sentiment and market segmentation theories. The size of US market beta for the CEF sample is greater than the ETF sample and similarly, for the emerging market sample greater than the developing market sample. Third, the foreign exchange market risk is also relevant, although the magnitude is very small.

Fourth, when individually examined, the difference between the up– and the down– market betas for the US market are found to be significant for the full, CEF and emerging market samples only. This significance remains valid even when the issue is examined simultaneously in all three markets in the same specification. The finding is also robust to two different formulations of up– and down– markets. Also, a positive and significant value of $\delta_D (\equiv \beta_D^- - \beta_D^+)$ means that down– market beta for the US market is greater than the up– market beta indicating that the country funds respond more to the bear market condition than to the bull market conditions. As for the foreign market conditions, the coefficientδ_F ($\equiv \beta_F^- - \beta_F^+$) is significant for the full, CEF and the developed market samples as in Table 6. However, when variables for the other two markets are added in the equation, δ_F is no longer significant, as can be seen in table 8. Finally, δ_X ($\equiv \beta_X^- - \beta_X^+$) is not significant in any of the specifications. Therefore, we conclude that the only market movement to which the country fund returns respond differently for the up– and down– markets is the US market.

Table 1: List of Country Mutual Funds

Country	Ticker	Name	Inception Date
Panel A: Developed Market (Closed End Funds)			
Australia	IAF	Aberdeen Australia Equity Fund	12/12/1985
Germany	GF	New Germany Fund	01/30/ 1990
Ireland	IRL	The New Ireland Fund	12/22/1989
Japan	JEQ	Japan Equity Fund	07/17/1992
Singapore	SGF	Singapore Fund	07/24/ 1990
Switzerland	SWZ	Swiss Helvetia Fund	08/ 19/1987
Panel B: Developed Market (Exchange Traded Funds)			
Australia	EWA	MSCI Australia Index Fund	03/12/1996
Austria	EWO	MSCI Austria Investable Market Index Fund	03/12/1996
Belgium	EWK	MSCI Belgium Investable Market Index Fund	03/12/1996
Canada	EWC	MSCI Canada Index Fund	03/12/1996
France	EWQ	MSCI France Index Fund	03/12/1996
Germany	EWG	MSCI Germany Index Fund	03/12/1996
Hong Kong	EWH	MSCI Hong Kong Index Fund	03/12/1996
Italy	EWI	MSCI Italy Index Fund	03/12/1996
Japan	EWJ	MSCI Japan Index Fund	03/12/1996
Netherlands	EWN	MSCI Netherlands Investable Market Index Fund	03/12/1996
Singapore	EWS	MSCI Singapore Index Fund	03/12/1996
Spain	EWP	MSCI Spain Index Fund	03/12/1996
Sweden	EWD	MSCI Sweden Index Fund	03/12/1996
Switzerland	EWL	MSCI Switzerland Index Fund	03/12/1996
United Kingdom	EWU	MSCI United Kingdom Index Fund	03/12/1996
Panel C: Emerging Market (Closed End Funds)			
India	IFN	India Fund	02/23/1994
China	CHN	China Fund	07/10/1992
Chile	CH	Aberdeen Chile Fund, Inc.	09/25/1989
Mexico	MXF	Mexico Fund	06/03/ 1981
Russia	TRF	Templeton Russia Fund Inc	06/15/ 1995
Korea	KF	Korea Fund	08/22/1984
Taiwan	TWN	Taiwan Fund	12/16/1986
Thailand	TTF	Thai Fund	02/17/1988
Turkey	TKF	Turkey Fund	12/05/ 1989
Panel D: Emerging Market (Exchange Traded Funds)			
Brazil	EWZ	MSCI Brazil Index Fund	07/10/2000
Malaysia	EWM	MSCI Malaysia Index Fund	03/12/1996
Mexico	EWW	MSCI Mexico Investable Market Index Fund	03/12/1996
South Korea	EWY	MSCI South Korea Index Fund	05/9/2000

Table 2: Descriptive Statistics: Closed End Country Funds

This table presents the descriptive statistics of the weekly returns for the country CEF. μ_{MF} is mean of the returns and σ_{MF} is its standard deviation on the funds over the sample period between 2001 and 2012 and *JB* is the Jerque–Bera test statistics for testing normality. ρ_{auto} is first order autocorrelation in the returns on CEFs, ρ_F is their correlation with foreign market returns (i.e. returns on MSCI country index) and ρ_{US} is their correlation with US market returns (i.e. returns on S&P 500 index). $\rho_{US,F}$ denotes the correlation between US and foreign market returns, while ρ_{OUS} is the correlation between CEF returns and orthogonalized US market returns.

Country	μ_{MF} **(%)**	σ_{MF} **(%)**	***JB***	ρ_{auto}	ρ_F	ρ_{US}	$\rho_{US,F}$	ρ_{OUS}
Panel A: Developed Markets								
Australia	0.085	4.467	311.4	−0.083	0.775	0.665	0.646	0.215
Germany	0.085	4.318	695.9	−0.017	0.814	0.768	0.775	0.216
Ireland	−0.071	4.690	133.7	0.117	0.660	0.588	0.627	0.223
Japan	−0.004	3.499	370.1	−0.032	0.667	0.582	0.460	0.310
Singapore	0.136	3.862	562.9	−0.020	0.751	0.629	0.585	0.235
Switzerland	−0.041	2.999	968.2	−0.053	0.739	0.669	0.712	0.203
Panel B: Emerging Markets								
India	0.082	5.394	213.1	−0.030	0.728	0.574	0.464	0.266
China	0.129	5.023	463.1	−0.127	0.540	0.517	0.513	0.279
Chile	0.088	4.345	223.4	−0.007	0.722	0.502	0.553	0.123
Mexico	0.094	4.095	103.1	−0.008	0.839	0.654	0.715	0.077
Russia	0.029	6.795	630.4	−0.048	0.623	0.557	0.524	0.270
Korea	−0.157	6.724	168.4	0.014	0.491	0.374	0.500	0.148
Taiwan	0.065	4.163	113.0	0.044	0.753	0.559	0.484	0.221
Thailand	0.304	5.533	297.7	−0.073	0.650	0.514	0.383	0.287
Turkey	0.126	6.456	213.1	−0.036	0.764	0.572	0.464	0.245

Notes: JB test statistics is distributed as $\chi^2(2)$ under the null of normality. All values reported in this table are significant at 5% level.

Table 3: Descriptive Statistics: Exchange Traded Country Funds

This table presents the descriptive statistics of the weekly returns for the country ETF. μ_{MF} is mean of the returns and σ_{MF} is its standard deviation on the funds over the sample period between 2001 and 2012 and *JB* is the Jerque–Bera test statistics for testing normality. ρ_{auto} is first order autocorrelation in the returns on ETFs, ρ_F is their correlation with foreign market returns (i.e. returns on MSCI country index) and ρ_{US} is their correlation with US market returns (i.e. returns on S&P 500 index). $\rho_{US,F}$ denotes the correlation between US and foreign market returns, while ρ_{OUS} is the correlation between ETF returns and orthogonalized US market returns.

Country	μ_{MF} (%)	σ_{MF} (%)	*JB*	ρ_{auto}	ρ_F	ρ_{US}	$\rho_{US,F}$	ρ_{OUS}
Panel A: Developed Markets								
Australia	0.141	3.730	113.8	−0.040	0.882	0.745	0.656	0.220
Austria	0.130	4.164	871.5	−0.039	0.932	0.673	0.612	0.129
Belgium	−0.003	3.779	1167	−0.040	0.891	0.759	0.683	0.206
Canada	0.114	3.383	354.0	−0.012	0.962	0.785	0.798	0.027
France	−0.017	3.697	204.7	−0.122	0.940	0.844	0.790	0.165
Germany	0.025	3.888	316.7	−0.052	0.943	0.839	0.788	0.157
Hong Kong	0.081	3.438	286.4	−0.075	0.851	0.721	0.591	0.269
Italy	−0.100	3.929	244.7	−0.068	0.941	0.767	0.710	0.141
Japan	−0.024	3.063	295.7	−0.086	0.849	0.633	0.473	0.262
Netherlands	−0.031	3.640	21.4	−0.090	0.930	0.832	0.770	0.181
Singapore	0.116	3.539	741.4	−0.034	0.864	0.662	0.591	0.187
Spain	0.027	3.868	73.17	−0.051	0.930	0.734	0.679	0.139
Sweden	0.075	4.452	157.4	−0.084	0.919	0.807	0.752	0.174
Switzerland	0.071	2.876	57.33	−0.095	0.900	0.781	0.721	0.190
UK	−0.005	3.092	311.9	−0.118	0.912	0.847	0.783	0.215
Panel B:Emerging Markets								
Brazil	0.200	5.312	133.3	−0.037	0.951	0.648	0.619	0.075
Malaysia	0.172	2.893	133.6	−0.017	0.831	0.510	0.404	0.190
Mexico	0.261	4.059	189.3	−0.068	0.961	0.737	0.723	0.061
South Korea	0.260	4.718	432.4	−0.034	0.872	0.666	0.506	0.260

Notes: JB test statistics is distributed as $\chi^2(2)$ under the null of normality. All values reported in this table are significant at 5% level.

Table 4: Results of 3–Factor Models: Panel Approach

This table presents the results of the 3 factor model based on the fowling system of equations

$$R_{Dt} = a + b\, R_{Ft} + u_t$$
$$R_t = \alpha + \beta_D\, \ddot{R}_{Dt} + \beta_F\, R_{Ft} + \beta_X\, R_{Xt} + e_t$$

where, R_t is return on the individual mutual fund at time t, $R_{D,t}$ is returns on the domestic or the US market, $\ddot{R}_{Dt} = \hat{u}_t$, is the US market returns orthogonalized to the foreign market, $R_{F,t}$ is returns on the foreign market and R_{Xt} is returns on the foreign exchange market, all observed in week t and expressed net of one–month US Treasury Bill yield. The coefficients β_D, β_F and β_X are domestic, foreign and foreign exchange market betas, respectively and α is the intercept. Estimation is done using two–step GMM with moment conditions given in equations (5) and (6).

Sample	$\boldsymbol{\alpha}$	$\boldsymbol{\beta_D}$	$\boldsymbol{\beta_F}$	$\boldsymbol{\beta_X}$	AR^2(%)	Funds	nob
Full Sample	−0.001 (0.002)	0.436 (0.000)	0.863 (0.000)	−0.083 (0.002)	66.85	34	20,978
CEF	−0.002 (0.002)	0.512 (0.000)	0.803 (0.000)	−0.034 (0.370)	52.26	15	9,255
ETF	−0.001 (0.043)	0.338 (0.000)	0.928 (0.000)	−0.094 (0.000)	86.77	19	11,723
Developed	−0.001 (0.052)	0.393 (0.000)	0.909 (0.000)	−0.068 (0.014)	78.18	21	12,957
Emerging	−0.002 (0.000)	0.481 (0.000)	0.815 (0.000)	−0.101 (0.020)	57.01	13	8,021

Notes: p–values are reported in parentheses based on the cluster (time) adjusted standard error.

Table 5: The US Market Conditions and CMF Risk Exposure

This table presents the results of the 3 factor model based on the fowling system of equations

$$R_{Dt} = a + b\, R_{Ft} + u_t$$
$$\ddot{R}^{-}_{Dt} = c + d\, R^{-}_{Ft} + v_t$$
$$R_t = \alpha + \beta_D\, \ddot{R}_{Dt} + \delta_D \ddot{R}^{-}_{Dt} + \beta_F\, R_{Ft} + \beta_X\, R_{Xt} + e_t$$

where, R_t is return on the individual mutual fund at time t, $R_{D,t}$ is returns on the domestic or the US market, $\ddot{R}_{Dt} = \hat{u}_t$ and $\ddot{R}^{-}_{Dt} = \hat{v}_t$ is the US market returns orthogonalized to the foreign market, $R_{F,t}$ is returns on the foreign market and R_{Xt} is returns on the foreign exchange market, all observed in week t and expressed net of one–month US Treasury Bill yield. The coefficients β_D, β_F and β_X are domestic, foreign and foreign exchange market betas, respectively and α is the intercept. Estimation is done using two–step GMM with moment conditions given in equations (5) and (6).

Panel A: $\ddot{R}^{+}_{Dt} \equiv Max(\ddot{R}_{Dt}, 0)$ and $\ddot{R}^{-}_{Dt} \equiv Min(\ddot{R}_{Dt}, 0)$

Sample	$\boldsymbol{\alpha}$	$\boldsymbol{\beta_D}$	$\boldsymbol{\delta_D}$	$\boldsymbol{\beta_F}$	$\boldsymbol{\beta_X}$	$AR^2(\%)$
Full Sample	−0.001	0.350	0.148	0.863	−0.081	66.90
	(0.002)	(0.000)	(0.026)	(0.000)	(0.003)	
CEF	−0.002	0.339	0.297	0.803	−0.029	52.40
	(0.002)	(0.000)	(0.000)	(0.000)	(0.459)	
ETF	−0.001	0.321	0.030	0.928	−0.094	86.77
	(0.042)	(0.000)	(0.693)	(0.000)	(0.000)	
Developed	0.000	0.332	0.105	0.909	−0.068	78.19
	(0.051)	(0.000)	(0.123)	(0.000)	(0.014)	
Emerging	−0.002	0.354	0.219	0.816	−0.091	57.11
	(0.001)	(0.000)	(0.016)	(0.000)	(0.036)	

Panel B: $\ddot{R}^{+}_{Dt} \equiv Max(\ddot{R}_{Dt}, \mu_m)$ and $\ddot{R}^{+}_{Dt} \equiv Min(\ddot{R}_{Dt}, \mu_m)$

Sample	$\boldsymbol{\alpha}$	$\boldsymbol{\beta_D}$	$\boldsymbol{\delta_D}$	$\boldsymbol{\beta_F}$	$\boldsymbol{\beta_X}$	$AR^2(\%)$
Full Sample	−0.001	0.355	0.138	0.863	−0.081	0.6690
	(0.002)	(0.000)	(0.026)	(0.000)	(0.003)	
CEF	−0.002	0.354	0.269	0.803	−0.029	0.5240
	(0.002)	(0.000)	(0.000)	(0.000)	(0.448)	
ETF	−0.001	0.318	0.034	0.928	−0.094	0.8677
	(0.042)	(0.000)	(0.625)	(0.000)	(0.000)	
Developed	−0.000	0.336	0.097	0.909	−0.068	0.7819
	(0.050)	(0.000)	(0.123)	(0.000)	(0.013)	
Emerging	−0.002	0.362	0.205	0.816	−0.092	0.5711
	(0.001)	(0.000)	(0.015)	(0.000)	(0.035)	

Notes: p–values are reported in parentheses based on the cluster (time) adjusted standard error.

Table 6: Foreign Market Conditions and CMF Risk Exposure

This table presents the results of the 3 factor model based on the fowling system of equations

$$R_{Dt} = a + b\, R_{Ft} + u_t$$
$$R_t = \alpha + \beta_D\, \ddot{R}_{Dt} + \beta_F\, R_{Ft} + \delta_F\, R^{-}_{Ft} + \beta_X\, R_{Xt} + e_t$$

where, R_t is return on the individual mutual fund at time t, $R_{D,t}$ is returns on the domestic or the US market, $\ddot{R}_{Dt} = \hat{u}_t$, is the US market returns orthogonalized to the foreign market, $R_{F,t}$ is returns on the foreign market and R_{Xt} is returns on the foreign exchange market, all observed in week t and expressed net of one–month US Treasury Bill yield. The coefficients β_D, β_F and β_X are domestic, foreign and foreign exchange market betas, respectively and α is the intercept. Estimation is done using two–step GMM with moment conditions given in equations (5) and (6).

Panel A: $\ddot{R}^{+}_{Dt} \equiv Max(\ddot{R}_{Dt}, 0)$ and $\ddot{R}^{-}_{Dt} \equiv Min(\ddot{R}_{Dt}, 0)$

Sample	$\boldsymbol{\alpha}$	$\boldsymbol{\beta_D}$	$\boldsymbol{\beta_F}$	$\boldsymbol{\delta_F}$	$\boldsymbol{\beta_X}$	$AR^2(\%)$
Full Sample	−0.001	0.434	0.818	0.074	−0.078	66.90
	(0..276)	(0.000)	(0.000)	(0.026)	(0.004)	
CEF	−0.001	0.507	0.729	0.121	−0.026	52.38
	(0.721)	(0.000)	(0.000)	(0.003)	(0.493)	
ETF	−0.001	0.338	0.919	0.014	−0.093	86.77
	(0.173)	(0.000)	(0.000)	(0.699)	(0.000)	
Developed	0.000	0.394	0.859	0.081	−0.064	78.25
	(0.924)	(0.000)	(0.000)	(0.062)	(0.021)	
Emerging	−0.001	0.479	0.779	0.060	−0.094	57.03
	(0.093)	(0.000)	(0.000)	(0.201)	(0.032)	

Panel B: $\ddot{R}^{+}_{Dt} \equiv Max(\ddot{R}_{Dt}, \mu_m)$ and $\ddot{R}^{+}_{Dt} \equiv Min(\ddot{R}_{Dt}, \mu_m)$

Sample	$\boldsymbol{\alpha}$	$\boldsymbol{\beta_D}$	$\boldsymbol{\beta_F}$	$\boldsymbol{\delta_F}$	$\boldsymbol{\beta_X}$	$AR^2(\%)$
Full Sample	−0.001	0.434	0.820	0.071	−0.078	0.6690
	(0.229)	(0.000)	(0.000)	(0.026)	(0.004)	
CEF	0.000	0.507	0.731	0.118	−0.027	0.5238
	(0.644)	(0.000)	(0.000)	(0.003)	(0.491)	
ETF	0.000	0.338	0.919	0.014	−0.093	0.8677
	(0.153)	(0.000)	(0.000)	(0.698)	(0.000)	
Developed	0.000	0.394	0.861	0.077	−0.064	0.7824
	(0.985)	(0.000)	(0.000)	(0.062)	(0.021)	
Emerging	−0.001	0.479	0.779	0.059	−0.094	0.5703
	(0.083)	(0.000)	(0.000)	(0.201)	(0.032)	

Notes: p–values are reported in parentheses based on the cluster (time) adjusted standard error.

Table 7: The Foreign Exchange Market Conditions and CMF Risk Exposure

This table presents the results of the 3 factor model based on the fowling system of equations

$$R_{Dt} = a + b\, R_{Ft} + u_t$$
$$R_t = \alpha + \beta_D\, \ddot{R}_{Dt} + \beta_F\, R_{Ft} + \beta_X\, R_{Xt} + \delta_F\, R_{Xt}^{-} + e_t$$

where, R_t is return on the individual mutual fund at time t, $R_{D,t}$ is returns on the domestic or the US market, $\ddot{R}_{Dt} = \hat{u}_t$, is the US market returns orthogonalized to the foreign market, $R_{F,t}$ is returns on the foreign market and R_{Xt} is returns on the foreign exchange market, all observed in week t and expressed net of one–month US Treasury Bill yield. The coefficients β_D, β_F and β_X are domestic, foreign and foreign exchange market betas, respectively and α is the intercept. Estimation is done using two–step GMM with moment conditions given in equations (5) and (6).

Panel A: $\ddot{R}_{Dt}^{+} \equiv Max(\ddot{R}_{Dt}, 0)$ and $\ddot{R}_{Dt}^{-} \equiv Min(\ddot{R}_{Dt}, 0)$

Sample	$\boldsymbol{\alpha}$	$\boldsymbol{\beta_D}$	$\boldsymbol{\beta_F}$	$\boldsymbol{\beta_X}$	$\boldsymbol{\delta_X}$	$AR^2(\%)$
Full Sample	−0.001	0.435	0.863	−0.101	−0.028	66.85
	(0.012)	(0.000)	(0.000)	(0.007)	(0.630)	
CEF	0.001	0.510	0.801	−0.075	−0.069	52.26
	(0.052)	(0.000)	(0.000)	(0.128)	(0.469)	
ETF	−0.001	0.338	0.928	−0.092	−0.002	86.76
	(0.042)	(0.000)	(0.000)	(0.031)	(0.966)	
Developed	−0.001	0.393	0.909	−0.062	−0.008	78.18
	(0.101)	(0.000)	(0.000)	(0.248)	(0.918)	
Emerging	−0.002	0.480	0.814	−0.126	0.049	57.01
	(0.015)	(0.000)	(0.000)	(0.008)	(0.596)	

Panel B: $\ddot{R}_{Dt}^{+} \equiv Max(\ddot{R}_{Dt}, \mu_m)$ and $\ddot{R}_{Dt}^{+} \equiv Min(\ddot{R}_{Dt}, \mu_m)$

Sample	$\boldsymbol{\alpha}$	$\boldsymbol{\beta_D}$	$\boldsymbol{\beta_F}$	$\boldsymbol{\beta_X}$	$\boldsymbol{\delta_F}$	$AR^2(\%)$
Full Sample	−0.001	0.435	0.862	−0.104	0.033	0.6685
	(0.006)	(0.000)	(0.000)	(0.002)	(0.493)	
CEF	−0.001	0.509	0.801	−0.081	0.076	0.5226
	(0.026)	(0.000)	(0.000)	(0.072)	(0.335)	
ETF	−0.001	0.338	0.928	−0.094	0.000	0.8676
	(0.037)	(0.000)	(0.000)	(0.014)	(0.989)	
Developed	−0.001	0.393	0.909	−0.068	0.000	0.7818
	(0.072)	(0.000)	(0.000)	(0.133)	(0.999)	
Emerging	−0.002	0.479	0.813	−0.132	0.058	0.5701
	(0.007)	(0.000)	(0.000)	(0.003)	(0.463)	

Notes: p–values are reported in parentheses based on the cluster (time) adjusted standard error.

Table 8: All Market Conditions and CMF Risk Exposure

This table presents the results of the 3 factor model based on the fowling system of equations

$$R_{Dt} = a + b\, R_{Ft} + u_t$$
$$\ddot{R}^{-}_{Dt} = c + d\, R^{-}_{Ft} + v_t$$
$$R_t = \alpha + \beta_D\, \ddot{R}_{Dt} + \delta_D\, \ddot{R}^{-}_{Dt} + \beta_F\, R_{Ft} + \delta_F\, R^{-}_{Ft} + \beta_X\, R_{Xt} + \delta_X\, R^{-}_{Xt} + e_t$$

where, R_t is return on the individual mutual fund at time t, $R_{D,t}$ is returns on the domestic or the US market, $\ddot{R}_{Dt} = \hat{u}_t$ and $\ddot{R}^{-}_{Dt} = \hat{v}_t$ is the US market returns orthogonalized to the foreign market, $R_{F,t}$ is returns on the foreign market and R_{Xt} is returns on the foreign exchange market, all observed in week t and expressed net of one–month US Treasury Bill yield. The coefficients β_D, β_F and β_X are domestic, foreign and foreign exchange market betas, respectively and α is the intercept. Estimation is done using two–step GMM with moment conditions given in equations (5) and (6).

Panel A: $\ddot{R}^{+}_{Dt} \equiv Max(\ddot{R}_{Dt}, 0)$ and $\ddot{R}^{-}_{Dt} \equiv Min(\ddot{R}_{Dt}, 0)$

Country	$\boldsymbol{\beta_D}$	$\boldsymbol{\delta_D}$	$\boldsymbol{\beta_F}$	$\boldsymbol{\delta_F}$	$\boldsymbol{\beta_X}$	$\boldsymbol{\delta_X}$	$\boldsymbol{AR^2}$(%)
Full Sample	0.365	0.121	0.854	0.043	−0.060	−0.029	66.93
	(0.000)	(0.095)	(0.000)	(0.250)	(0.143)	(0.629)	
CEF	0.360	0.258	0.794	0.066	−0.008	−0.029	52.46
	(0.000)	(0.002)	(0.000)	(0.150)	(0.878)	(0.770)	
ETF	0.324	0.025	0.927	0.008	−0.084	−0.014	86.77
	(0.000)	(0.770)	(0.000)	(0.858)	(0.076)	(0.801)	
Developed	0.359	0.061	0.880	0.065	−0.022	−0.065	78.25
	(0.000)	(0.395)	(0.000)	(0.147)	(0.686)	(0.371)	
Emerging	0.361	0.207	0.826	0.021	−0.082	−0.013	57.11
	(0.000)	(0.029)	(0.000)	(0.690)	(0.120)	(0.888)	

Panel B: $\ddot{R}^{+}_{Dt} \equiv Max(\ddot{R}_{Dt}, \mu_m)$ and $\ddot{R}^{+}_{Dt} \equiv Min(\ddot{R}_{Dt}, \mu_m)$

Sample	$\boldsymbol{\beta_D}$	$\boldsymbol{\delta_D}$	$\boldsymbol{\beta_F}$	$\boldsymbol{\delta_F}$	$\boldsymbol{\beta_X}$	$\boldsymbol{\delta_X}$	$\boldsymbol{AR^2}$(%)
Full Sample	0.370	0.112	0.854	0.041	−0.072	−0.010	67.50
	(0.000)	(0.091)	(0.000)	(0.251)	(0.048)	(0.836)	
CEF	0.374	0.230	0.790	0.066	−0.026	0.001	52.36
	(0.000)	(0.002)	(0.000)	(0.133)	(0.576)	(0.990)	
ETF	0.320	0.032	0.930	0.004	−0.088	−0.007	87.68
	(0.000)	(0.684)	(0.000)	(0.920)	(0.033)	(0.872)	
Developed	0.360	0.058	0.882	0.060	−0.037	−0.041	78.27
	(0.000)	(0.374)	(0.000)	(0.152)	(0.414)	(0.472)	
Emerging	0.368	0.193	0.825	0.019	−0.096	0.009	58.34
	(0.000)	(0.027)	(0.000)	(0.714)	(0.050)	(0.906)	

Notes: p–values are reported in parentheses based on the cluster (time) adjusted standard error.

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Appendix:

For alternative formulation, see Silvapulle et al. (2004, p. 362), Woodward and Anderson (2009, p.916) and Huang and Wu (2005, p. 322)

Consider a one–factor asset pricing model is designed to capture the upside and downside market,

$$R_t = \alpha + \beta^+ R_M^+ + \beta^- R_M^- + e_t \quad \text{(A1)}$$

where, $R_M^+ = Max(\, R_M, 0)$ and $R_M^- = Min(R_M, 0)$ are positive and negative returns on the domestic markets, respectively. Recall that $R_M = R_M^+ + R_M^-$, so that $R_M^+ = R_M - R_M^-$ which can be replaced in A1 to get,

$$R_t = \alpha + \beta^+ (R_M - R_M^-) + \beta^- R_M^- + e_t \quad \text{(A2)}$$

Opening the parentheses,

$$R_t = \alpha + \beta^+ R_M - \beta^+ R_M^- + \beta^- R_M^- + e_t \quad \text{(A3)}$$

and, rearranging we get,

$$R_t = \alpha + \beta\, R_M + \delta\, R_M^- + e_t \quad \text{(A4)}$$

where, β replaces β^+ for simplicity and $\delta = (\beta^- - \beta^+)$. Under the null hypothesis, $\delta = 0$ implies $\beta^- = \beta^+$, indicating no difference between the upside and downside market beta.