Performance and Persistence of Emerging Markets Equity Mutual Funds

Abstract

This paper analyzes the performance of emerging markets equity mutual funds from January 2005 to December 2017, using a four factor model, which is standard in the analysis of funds in developed markets, but has not been previously used in emerging markets. We start by showing that emerging market funds generate consistent abnormal returns over the entire sample period as well as during different sub-periods. These results suggest that emerging markets provide, beyond diversification benefits, opportunities for abnormal returns. Our results also show that funds present persistence of performance across holding periods of up to one year, i.e., better performing funds keep outperforming their bottom peers in subsequent periods. Interestingly, we show that even bottom performing funds are on average able to generate positive excess returns and risk-adjusted returns across different holding periods.

KEYWORDS: *emerging markets, equity mutual funds, performance, persistence.*

1 Introduction

The volume of net assets under management of mutual funds have more than quadrupled in the last 20 years to 16 trillion USD in 2016 (The Investment Company Institute (ICI), 2017, p. 170). A significant portion of this growth corresponds to assets in emerging markets, due to the trend of investors allocating a higher proportion of their geographic portfolio exposure into emerging markets (Lipper Alpha Insight, 2013). While holdings from the emerging markets assets within the Morgan Stanley Capital International All-Country World Index (MSCI ACWI) made up a share of 3.42% in 2001 (Lipper Alpha Insight, 2013), their share as of the end of 2017 was 8.66% (Morningstar, Inc., n.d.).

Funds investing in emerging markets are generally riskier than the ones investing in developed markets. During the financial turmoil in 2008, for example, emerging market funds lost on average 55%, compared to a loss of 38% of the MSCI World index in the same year (Lipper Alpha Insight, 2013). Even though emerging market mutual funds are associated with higher risk, they still provide interesting performance opportunities because, as Pástor, Stambaugh & Taylor (2015) note, increasing money inflows into mutual funds indicate decreasing abilities to outperform passive benchmark indices. Although the size of the active and passive emerging market mutual fund industry is increasing, the total volume is still considerably smaller compared to developed markets. Emerging markets may also help reducing overall portfolio risk by benefitting from a better diversification.[1]

Despite the growing popularity of emerging market funds as well as the outperformance possibilities, the vast majority of literature on mutual fund performance and persistence still focuses on US mutual funds (see, e.g., Grinblatt & Titman (1992), Hendricks, Patel, & Zeckhauser (1993), Brown & Goetzmann (1995), Droms & Walker (2001), Bollen & Busse (2004), Agarwal et al. (2015) and Jiang and Verardo (2018)).

Emerging markets are inherently different from developed markets for a number of reasons, and the findings of the literature on performance assessment and persistence of performance for developed markets may not apply for emerging economies. As Huij & Post (2011) state, emerging markets are less efficient compared to developed countries. These market inefficiencies potentially allow managers of mutual funds to obtain abnormal returns.[2]

The few studies on emerging market mutual funds use methodological approaches that can be considered incomplete. For example, Gottesman & Morey (2007) predicts mutual fund performance only by analyzing fund characteristics. Basu & Huang-Jones (2015) tests for abnormal returns by exclusively applying the single-factor and the Fama-French three-factor model, although the momentum factor has long been standard in the current developed market literature. Kiymaz & Simsek (2017) analyze emerging markets equity and bond funds, but they restrain their analysis to funds based in the US. The results show no evidence of positive and significant alphas for bond funds, yet there observe some abnormal returns for equity funds in certain subperiods. Looking at the performance persistence literature, Huij & Post (2011) investigate performance persistence for a holding period of only one month, again failing to measure persistence over different time horizons as has

[1]For example, the Morgan Stanley Capital International Emerging Market Index (MSCI EM) outperformed the developed markets equivalent, Morgan Stanley Capital International World Index (MSCI World) by almost 150 percentage points from the beginning of 1990 to December 2017 (MSCI Inc., 2017). Emerging markets also feature lower correlations in returns with developed economies.

[2] Even though most authors agree that emerging markets are less efficient than developed markets (e.g., Risso (2009)), others contradict this hypothesis (e.g., Griffin, Kelly, & Nardari (2010)). Nevertheless, according to Basu & Huang-Jones (2015), most agree that the level of efficiency in the respective markets is heterogeneous.

been standard in developed markets literature. Table 1 provides a compilation of the most important studies on emerging markets equity mutual funds.

[Insert Table 1 here]

This paper investigates emerging market equity mutual fund performance and persistence by more thorough methodological approaches and hence decrease the methodological gap that exists between developed and emerging market fund literature, allowing for better comparability between the empirical findings obtained for emerging and developed markets. These methodological gaps are addressed in two fronts. First, in the study of fund performance, we use a Carhart four-factor model to assess fund performance (i.e., we add the momentum factor to the three-factor model used by Basu & Huang Jones, 2015), in line with the most recent studies on fund performance in developed markets (e.g., Jiang & Verardo, 2018 and Agarwal et al. 2015). As markets are volatile in emerging economies, it is particularly desirable to incorporate the role of the momentum factor in explaining price movements. Second, we investigate performance persistence for several different holding periods (as opposed to Huji & Jones, 2011 and Basu & Huang Jones, 2015), allowing us to draw more conclusive inferences. Finally, we add to Kiymaz & Simsek (2017) because we do not restrain our sample to US based funds.

Our analysis covers the period from January 2005 to December 2017 as well as three subperiods (pre-crisis, during the crisis and post-crisis). In a first step, we calculate the mean monthly returns and the Sharpe ratio for a sample of emerging markets equity mutual funds. In a second step, we use Fama-MacBeth regressions based on the single-factor model, the Fama-French three-factor and the Carhart four-factor model. The results show that over the entire sample period emerging market equity funds were able to generate abnormal returns that are large enough to cover the expenses, even for the poorer performing funds.

Our analysis reveals strong performance persistence using the parametric rank portfolio approach. Therefore, historically better performing funds keep outperforming their bottom peers across several different holding periods of up to one year.

Our results diverge from the previous papers, and the differences can, at least in part, be explained by the use of different models. Based on a robustness check suggested by Petersen (2009), we find to which degree time and fund effects occur in our data. Based on this, we then attempt to correct biases in the standard errors by using Fama-MacBeth regressions. The other papers do not mention any correction to the standard errors, and therefore our paper differs not only in the models used, but also in the more careful approach used to estimate standard errors.

The remainder of this paper is structured as follows: Section 2 provides a literature overview of mutual funds performance and persistence literature. Section 3 shows the methodological approaches used and section 4 describes the data. Section 5 presents the results and section 6 brings our concluding remarks.

2 Literature Review

The analysis of mutual fund performance in the US dates back to Jensen (1968), who finds little evidence for outperformance abilities of individual fund managers, indicating on average an alpha of zero. Ippolito (1989) builds up methodologically on Jensen's (1968) work and finds positive average alphas which are sufficient to offset fund charges. However, Elton, et al. (1993) contests the results of Ippolito (1989), by correcting sample selection and return measurement that caused biases

towards finding positive alphas. After including different indices for bonds or non-S&P stocks, all average alphas were negative with almost none statistically significant positive alphas.

Gruber (1996) uses both the single-factor and the multi-factor index model for his analysis and concludes that the mutual funds underperformed the both models, indicating that fund managers do not create value for their investors net of charges. The author explains these results with the mutual funds having held smaller and more growth-oriented stocks than the S&P 500.

The literature on mutual fund performance has also researched other developed countries beyond the US, and most find evidence of fund underperformance (e.g., Cumby & Glen,1990) for internationally diversified US-based funds, Cai et al. (1997) for Japanese mutual funds and Blake & Timmermann (1998) for the UK. Otten & Bams (2002) are among the few European mutual fund researchers to find a statistically significant positive alpha. Out of the five investigated countries (UK, France, Germany, Netherlands, Italy), mutual funds from four countries could statistically significantly outperform the underlying benchmark net of expenses, with most of the outperforming funds categorized under the small-cap investment style

The research on the performance of emerging market funds has mostly been country or region specific (for example Swinkels & Rzezniczak, 2009; Lai & Lau, 2010; Dhar, 2013). Further studies examined the performance of mutual funds with a broader geographical investment focus on emerging markets as a whole. Abel & Fletcher (2004) analyze the performance of UK-based unit trusts with an investment focus in emerging markets using thirteen stochastic discount factor models. They find that neither individual trusts nor the average emerging market unit trust generated a positive alpha, considering net returns.

Gottesman & Morey (2007) investigate the predictability of future fund performance, considering emerging market funds, and find that investors were worse off with emerging market mutual funds because the fees and loads of active investment management are higher. Michelson, Philipova, & Srotova (2008) analyze emerging markets equity mutual fund performance over a six-year period and find that emerging market funds outperformed the MSCI index as well as the S&P 500, but not the emerging market index. Thus, investors should have preferred investing directly into the emerging market benchmark index. In addition, they find a negative relation between fund returns and turnover as well as a positive relationship between fund return and size. However, the authors excluded all funds with incomplete data throughout the research period, opening up the possibility for survivorship bias.

Eling & Faust (2010) study the performance of mutual funds and hedge funds in emerging markets from 1995 to 2008. Throughout the entire analysis period, the authors find mostly negative alphas, out of which only one performance measurement model shows statistical significance and is significantly different from zero. Although during some periods there were abnormal returns of emerging market mutual funds, the authors have shown that on average investors would have generated higher risk-adjusted returns investing in the benchmark indices.

While the research of emerging market open-end equity mutual funds is of utmost importance to this thesis, there are also studies looking at other fund types. Blitz & Huij (2012) evaluate the performance of global emerging market (GEM) equity exchange-traded funds (ETFs) and find that the ETFs on average fell short to the respective benchmark because of fees, loads and taxes paid for holding those ETFs. Abugri & Dutta (2009) come to the same result, namely no statistically significant alphas (p. 834). Kiymaz & Simsek (2017) analyze US-based emerging markets equity and bond funds. The results show no evidence of positive and significant alphas for bond funds, yet there have been some abnormal returns for equity funds in certain subperiods.

To sum up, with the exception of a few studies, the vast majority of performance literature infers that mutual funds from developed countries as well as emerging markets are not able to generate statistically significant alphas and thus underperform the underlying benchmark indices.

Another relevant issue in the literature regards the persistence of performance. There is a vast literature on performance persistence, with varying methodological approaches. The first approach uses the rank correlation coefficient over different periods (Jensen, 1968; Lehmann & Modest, 1987; Elton et al.,1993; Basu & Huang-Jones, 2015), whereas a second approach splits funds into winners and losers according to their performance and measures the statistical persistence of winner and loser funds over subsequent periods (Goetzmann & Ibbotson, 1994; Brown & Goetzmann, 1995; Malkiel, 1995; Droms & Walker, 2001). A third approach compares the performance of a mutual fund on its lags (Grinblatt & Titman, 1992; Hendricks, Patel, & Zeckhauser, 1993). Finally, a fourth approach forms portfolios of winner and loser funds based on past returns or alphas with the rank portfolio approach, comparing the resulting time-series of returns or alphas to a benchmark (Hendricks, Patel, & Zeckhauser, 1993; Elton, Gruber, & Blake, 1996; Carhart, 1997; Wermers, 1997; Blake & Timmermann, 1998; and Bollen & Busse, 2004, among others).

Most of these studies find some degree of persistence among funds, but they diverge on whether persistence stems mainly from the poor funds (i.e., poor returning funds tend to persist in bad performance), winner funds (i.e., best-performing funds tend to continue outperforming other funds), or a combination of both.

Few studies address performance persistence among emerging market equity mutual funds. Three studies use broad samples of emerging market funds: Gottesman & Morey (2007), Huij & Post (2011) and Basu & Huang-Jones (2015). Other studies look at country-level performance persistence, such as Muga, Rodriguez, & Santamaría (2007) in Mexico, Berggrun et al. (2014) in Brazil, and Urbański, Winiarz, & Urbański (2016) in Poland.

3 Methodology

3.1 Mutual fund performance

To assess the risk-adjusted returns of emerging market equity mutual funds, we apply different performance measures. First, we compute the Sharpe ratio (Sharpe, 1966), whose advantage is that it does not depend on any proxy for the market benchmark, and its usefulness lies on the assumption that investors consider volatility as a risk form. We also compute the "Jensen's α" for three different pricing models: the single-factor model, Fama and French`s three-factor model (Fama & French, 1993), and the Carhart (1997) four-factor model. The four-factor models looks as follows:

$$R_{it} - R_{ft} = \alpha_i + \beta_{i,m}\left(R_{mt} - R_f\right) + \beta_{i,SMB}SMB_t + \beta_{i,HML}HML_t + \beta_{i,MOM}MOM_t + \varepsilon_{it} \quad (1)$$

where R_{it} is the monthly return of fund *i* in month *t*, R_{mt} shows the monthly return of the benchmark index in month t, proxied by the MSCI emerging markets investable markets index (EM IMI), denominated in US dollar, and R_{ft} is the risk-free rate, proxied by the 1-month US Treasury Bill rate.

The three-factor model adds the variables SMB_t and HML_t, that depict the size (small minus big) and value (high minus low) factors in month *t*, respectively. To derive the SMB factor, the MSCI EM Large Cap index is deducted from the MSCI EM Small Cap index. The HML factor is derived by subtracting the MSCI EM IMI Growth index from the MSCI EM IMI Value index.

Finally, the four-factor model (Carhart, 1997) adds the Momentum factor MOM_t, given by the difference between a portfolio of funds with previous high 12-months return and one with low 12-months return. It is derived as the monthly changes in the MSCI EM Momentum total return index.

The estimated parameter of interest α_i is the Jensen's α of fund *i*, our measure of risk-adjusted performance, whereas $\beta_{i,m}$, $\beta_{i,SMB}$, $\beta_{i,HML}$ and $\beta_{i,MOM}$ denote the sensitivities of the return of fund *i* to each of the respective risk factors.

To select the appropriate estimation model that corrects for potential biases in standard errors, a robustness check has been conducted (results unreported). In these tests, the standard errors clustered by time are more than five times larger than the White standard errors, which is a strong indication of significant time effects in the data, since the standard errors are present even after including time dummies. This time effect leads to cross-sectional dependence among residuals of different funds in a given year. Petersen (2009, p. 472) proposes the use of the Fama-MacBeth model in case of present time effects. This two-step regression model first regresses all assets against the risk factors and then regresses the asset returns against the above-determined risk-factor betas. The resulting standard errors are unbiased to cross-sectional time effects. Hence, the single-factor, Fama-French three-factor and Carhart four-factor models are estimated using the Fama-MacBeth model. We follow Petersen (2009, p. 475) and cluster the standard errors at the fund level.

3.2 Mutual fund performance persistence

To analyze persistence in fund performance, we apply the rank portfolio approach. Starting in April 2005, individual funds are ranked each month by their excess returns (over the risk-free 1-month US Treasury Bill) over the past three months and are then grouped into performance terciles, following Huij & Post (2011). The tercile portfolios are equally weighted comprising the upper-third of performing funds (tercile 1), down to the bottom-third of performers (tercile 3). The reason to form terciles instead of deciles as in Carhart (1997) is the relatively small number of funds compared to US mutual funds samples. Moreover, for the sake of added detail, the upper and lower third of funds are further divided into terciles. We call portfolio 1A the one that comprises the upper ninth of performing funds, whereas portfolio 3C comprises the bottom ninth. While these portfolios are held for different time periods of 1 month, 2 months, 3 months, 6 months and 12 months (see, e.g., Eling (2009) and Basu & Huang-Jones (2015)), the portfolios are revised on a monthly basis to account for changing fund rankings (see, e.g., Carhart (1997)).

We use the raw excess return and the Sharpe ratio of the mutual funds for each tercile portfolio to analyze persistence. Performance persistence is then indicated by a positive difference between the excess return and the Sharpe ratios of the top- and bottom-tercile portfolio. Following Huij & Post (2011), funds that did not survive until the end of the sample period were included until they disappeared. The performance persistence analysis is not divided into sub-periods to include bullish and bearish markets, following Eling's (2009) recommendation of including different market cycles when studying performance persistence.

3.3 Effect of fund characteristics

We also investigate the effect of fund characteristics on performance. We base our analysis on the determinants used by Huij & Post (2011). The model looks as follows:

$$\alpha_{it} = \beta_0 + \beta_1 ER_{it} + \beta_2 TR_{it} + \beta_3 FL_{it} + \beta_4 RL_{it} + \beta_5 lnTNA_{it} + \varepsilon_{it} \qquad (5)$$

where α_{it} is the monthly measured alpha from the single-factor model, ER_{it} is the expense ratio of fund *i* in month *t*, TR_{it} is the turnover ratio (aggregated securities sales/purchases divided by TNA, total net assets under management), FL_{it} is the front-end loading, RL_{it} is the back-end loading, and $lnTNA_{it}$ is the natural logarithm of fund's *i* TNA at the end of the month *t*.

4 Data and descriptive statistics

4.1 Data

The mutual fund data are retrieved from the Center for Research in Security Prices (CRSP) database, which includes information on both living funds as well as liquidated or merged funds, meaning that it is free of survivorship bias.

To be included in the sample, funds need to have an investment focus on emerging market countries. Our sample comprises emerging market funds with the CRSP Objective Code (crsp_obj_cd) "EFRM", such that only actively managed equity mutual funds with an investment focus on emerging markets remain in the fund sample. In addition, we require the funds to have at least 12 months of return data to obtain meaningful performance measures, which is consistent with other studies like Basu & Huang-Jones (2015) and Kiymaz & Simsek (2017). Also, in case a fund has multiple share classes, all but the oldest share class are dropped (see, e.g., Huij & Post, 2011, and Kiymaz & Simsek, 2017). Passively managed funds, like ETF's or ETN's, are excluded. Moreover, funds whose name suggest an investment focus of specific countries or regions were manually dropped because, as Huij & Post (2011) note, common factor models might not be able to describe the fund returns properly, which is why resulting alphas can be due to model misspecifications instead of managerial abilities. Following Amihud & Goyenko (2013) and Elton, Gruber & Blake (1996), we further drop all funds with net asset values smaller than $15 million at the end of the year preceding the test year because inclusion of such funds can cause survivorship bias in estimation due to reporting conventions (Amihud & Goyenko, 2013).

We retrieve monthly data on returns and total net asset values (NAV) on all available mutual funds for the time period from January 2005 until December 2017. All return data are end-of-month, calculated as the monthly changes of the NAV, and are net of "fees, expenses, and brokerage commissions but before any front-end or back-end loads" (as in Amihud & Goyenko (2013), Cremers & Petajisto (2009) and Berggrun et al. (2014)). To reduce the effects of outliers, returns, expense ratios, and turnover ratios were winsorized at the bottom 1%-level and the top 99%-level. We also gather end-of-year data on fund characteristics from the CRSP database, involving expense ratios, turnover ratios as well as front-end and back-end loadings. The choice of fund characteristics is based on the fund characteristics selection of Huij & Post (2011). After all exclusions, the initial fund sample of 574 funds is reduced to 336 funds, including both living and liquidated funds. The final sample comprises 18.402 monthly return observations.

In addition to the data on mutual funds, we retrieve various emerging market total return indices to derive risk factors that can be attributed to emerging markets. In line with previous studies, the proxy for the riskless asset is the 1-month US Treasury Bill Rate that was gathered from the St. Louis Federal Reserve Bank, and the proxy for the emerging market portfolio is the MSCI Emerging Markets Investable Markets Index (MSCI EM IMI), denominated in US dollars (see, e.g., Kiymaz &

Simsek (2017)). The index comprises 24 emerging market countries[3] and is supposed to depict the risk and returns investors are exposed when investing in a portfolio of emerging market stocks. The risk factors of SMB_t, HML_t and MOM_t are derived from the specific MSCI EM indices previously described in the methodology section.

4.2 Descriptive statistics

Table 2 provides summary statistics for the fund sample, splitting between surviving and non-surviving funds. Of the overall 336 emerging market equity mutual funds, more than half were funds that survived until the end of the investigation period, while the other funds were terminated throughout the sample period. While the fund size in the entire sample averages approximately $1.2 billion, surviving funds are on average almost 3 times larger than their non-surviving counterparts, with about $1.5 billion in total net asset values. In addition, the median and mean returns show that surviving funds performed slightly better than non-surviving funds, while the respective standard deviations of surviving funds are lower, with values of 5.28% compared to 6.28% of non-surviving funds. The negative skewness among all funds indicate that extreme negative returns are more likely than extreme positive returns.

[Insert Table 2 here]

Table 3 summarizes different fund characteristics and is again split into all funds as well as surviving and non-surviving ones. The average expense ratio is on average 1.35% among all funds, which is considerably smaller than what Basu & Huang-Jones (2015) found. This possibly indicates the general market trend towards lower expensed funds. Nevertheless, it must be noted that the turnover ratio and the front-end loading, which have a mean of 70.95% and 0.66%, respectively, are higher than what Kiymaz & Simsek (2017) found. The back-end loadings have not been considered by any other study and average up to 0.02% with a standard deviation of 0.24%.

[Insert Table 3 here]

Since the general market conditions influence the risk-adjusted performance of emerging market securities severely, the sample period will be divided into three sub-periods in accordance with other authors (see, e.g., Kiymaz & Simsek (2017)). The respective sub-periods will involve both bear (2005-2008) and bull (2009-2012) markets as well as stagnating economies (2013-2017) and will serve as a robustness check.

5 Results

5.1 Performance against benchmark index and factor models

In this section, we report the monthly returns and Sharpe ratios of both the emerging market equity mutual fund sample and the MSCI EM IMI benchmark index that is used as a proxy for the market return.

[Insert Table 4 here]

Panel A of Table 4 shows that the mean monthly return of the mutual funds is 0.78%, ranging from -16.7% to 15.84% and the median is above the monthly return at 0.95%. The standard deviation of

[3] The MSCI EM IMI aims at capturing 85% of stock market capitalizations in following countries: Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Russia, Qatar, South Africa, Taiwan, Thailand, Turkey and United Arab Emirates.

the monthly returns lies at 5.6%. The average Sharpe ratio is 0.09, while the values range from -0.71 to 1.87 with a standard deviation of 0.22. Panel B shows that the mean monthly return of the MSCI EM IMI is 0.70% and the mean Sharpe ratio is 0.10. Therefore, mutual funds slightly outperformed the index by their monthly returns but not by their risk-adjusted performance.

Table 5 presents the performance analysis of the emerging market equity mutual funds and the benchmark by sub-periods. Columns 2-3 show that in the pre-crisis period until 2008 provided positive risk-adjusted returns with a Sharpe ratio of 0.31. During the high volatility environment of the global financial crisis (shown in columns 4-5), emerging market funds obtained their best average monthly returns at 1.52%, whereas during the relative stagnation period of emerging markets between 2013 and 2017, funds obtained a negative return on average.

[Insert Table 5 here]

Table 6 shows that the estimated alphas are positive and significant across all three regression models. Overall, under the single-factor, Fama-French and four factor models, the average fund generated statistically significant positive abnormal monthly returns (alphas) of 0.21%, 0.14% and 0.16% respectively. The market excess return coefficient has a value of 0.89 in the two first models and 0.79 in the four factor model, suggesting that the equity funds tracked the returns of the underlying index on average. The SMB and HML coefficients are both negative and statistically significant, whereas the momentum coefficient is positive and also statistically significant. The R^2 lies between 87.4% and 91.5%, indicating that, according to Basu & Huang-Jones (2015), emerging market funds might generally be more focused on diversification than active market timing.

[Insert Table 6 here]

The results of the sub-period analyses are shown in Table 7. The alphas reported in the first three columns are all positive, but are statistically significant only in the single-factor and three-factor models. During the other periods, reported in Panel B and C, it becomes clear that emerging market equity mutual funds generated positive and statistically significant abnormal monthly returns on average, ranging from 0.14% to 0.20% in the 2009-2012 period and from 0.11% to 0.16% in the 2013-2017 period.

[Insert Table 7 here]

The coefficient of the market excess return factor is statistically significantly positive with values ranging from 0.558 to 0.938 across all sub-periods. The SMB coefficients are negative in all specifications (but not significant in the last period), whereas the results for the HML factor are mixed, depending on the period and model. Finally, the momentum factor is positive and statistically significant across all periods, though the coefficients are substantially higher in the first two sub-periods.

Taken together, the results described in tables 6 and 7 favor the hypothesis that emerging market funds generate positive excessive returns. Comparing the results with those of other authors, Eling & Faust (2010) report a positive alpha only for the single-factor model with a value of 0.04%, which is lower than the alphas estimated in this paper. Huij & Post (2011) estimated alphas from the single-factor model across performance terciles ranked by past quarter performance. Even though their annual alphas from the single-factor and Fama-French model are negative, they are also insignificant. Our results also differ from Basu & Huang-Jones (2015), who found negative, but insignificant alphas in the financial crisis period of 2008.

The difference between our results and Basu & Huang-Jones´s (2015) findings may be explained in part by sample differences (as our sample contains more funds than theirs). Another reason for finding different results is the use of different methodological approaches: while this paper estimates risk factor alphas by the Fama-MacBeth model, which generates unbiased standard errors in case of a present time effect, the previous studies do not report the regression model applied, indicating that differences regarding statistical significance may be due to differences in methodological approaches. Nevertheless, in unreported robustness checks, we re-estimate the regressions reported in tables 6 and 7 using OLS regressions with standard errors clustered at several different levels (fund, month, and fund and month) as well as without any clustering, and our inferences remain unchanged. Therefore, sample differences seem to be driving the different results between the studies.

5.3 Performance persistence

Table 8 reports the average excess returns and Sharpe ratios of emerging market equity mutual funds over different holding periods. We start by noting that all the fund groups generate positive excess returns for all the holding periods considered, meaning that even the worst performing funds were able to outperform the risk-free rate. On the contrary, Carhart (1997) reported average monthly excess returns of the bottom decile of funds to be at -0.25%.

[Insert Table 8 here]

The results shown in the last row of table 8 indicate that funds that reported high returns in the past quarter (best tercile) tend to outperform their lower-performing peers (worst tercile) in subsequent periods, both in terms of raw excess returns as well as in terms of risk-adjusted returns (Sharpe ratio). It is noteworthy that the spreads between the top and bottom funds on average grow larger as we increase the holding period from one month to six months, both for excess returns and the Sharpe ratio. Even though the spreads of the 12-month holding period are lower than for the 6-month holding period, they are still positive. We claim that these results provide consistent evidence of performance persistence in emerging markets equity mutual funds. The reported return results are not annualized for the sake of showing the empirical performances within the respective holding periods. The annualized return spreads for the top and bottom tercile ranges from 0.11% (12 month holding period) to 1.17% (3 month holding period). These figures are significantly lower than the return spreads found in research on US mutual funds and emerging market mutual funds. Carhart (1997), for example, found the return spread between the top and bottom decile of funds to be 8.04% per annum, while Hendricks, Patel, & Zeckhauser (1993) present the return spread between the highest and lowest octile to be 5.00% per annum. Looking at the results of Huij & Post (2011), who analyzed performance persistence of emerging market equity mutual funds, the authors present a return spread between the top and bottom ninth of funds of 7.26% per annum.

The spreads between the top and bottom ninth of funds are shown in the second-last row of Table 9. The positive spread for the Sharpe ratios across all holding periods indicate persistence in risk-adjusted performance, consistent with our previous findings. However, the results for raw excess returns are less consistent across holding periods, as we observe negative spreads for the 1- and 12-month holding periods, and positive spreads for the 2, 3 and 6-month holding period. One possible reason for finding less consistent results in this analysis is that we have a relatively small number of funds in each group (top ninth and bottom ninth).[4]

[4] Depending on the month of analysis we have from 6 to 24 funds in the top and bottom ninth groups. Overall, the number of funds – and therefore the number of funds within each group – is increasing over the time.

5.4 Effect of fund characteristics

Table 9 reports the results of the estimation of equation 5, i.e., the regression of the monthly alphas derived from the single-factor model against the fund characteristics of expense ratio, turnover ratio, front-end, and back-end loading as well as the natural logarithm of the fund size.

[Insert Table 9 here]

The results in Table 8 show that the coefficients of *expense ratio* are positive in all regressions, although only the ones for the entire period (column 1) and the first period (column 2) are statistically significant at the usual levels. This result is at odds with previous studies both on the US market (Elton, Gruber, Das, & Hlavka,1993; Carhart, 1997) and on emerging markets (Gottesman & Morey, 2007). Even though Huij & Post (2011) find no relation of expense ratios on emerging markets fund performance persistence, they conclude that better performing funds seem to have lower expense ratio than their worse-performing counterparts.

We do not find *turnover ratio* and *front-end loading* to have a statistically significant effect on the risk-adjusted performance of emerging market funds. The results for *back-end loading* are mixed, as we observe a positive and significant effect for the entire period and the first period, a non-significant effect for the second period, and a negative effect in the last period. This result is an extension to existing mutual fund research because the effect of loadings on performance has barely been studied so far. For emerging markets mutual funds, only Huij & Post (2011) have analyzed this relation and concluded that performance persistence is robust to loadings.

Finally, the coefficients of the fund size (*lnTNA*) are all positive, and the ones in columns 1 and 2 are statistically significant at usual levels. This result is consistent with previous results, which relate higher fund sizes to more economies of scale and thus higher risk-adjusted returns (see, e.g., Droms & Walker (2001) and Bollen & Busse (2004)). Taking the estimate in column 1, a 10% increase in fund size is associated to an approximate 0.7% increase in the fund‘s alpha, ceteris paribus.

6 Concluding remarks

This paper analyzes the performance and persistence of emerging market equity mutual funds during the period from January 2005 until December 2017. We aim to close an existing gap in the mutual fund literature by applying a more thorough set of methodological approaches to decrease the methodological gap that exists between emerging and developed market fund literature and hence to allow more appropriate comparisons between developed and emerging markets mutual funds. Our methodological contribution to the literature is twofold. First, we are the first paper to investigate fund performance in emerging markets using, beyond the single factor model, the Fama-French three factor and the Carhart four factor models. Second, we investigate persistence of performance using several different holding periods, also adding to the literature on emerging market mutual funds.

The performance analysis shows that the mean monthly return is 0.78% for emerging market equity mutual funds and that they are able to generate a positive monthly alpha between 0.14% and 0.21%, depending on the underlying model. Our analysis splits our sample period into three subperiods (2005-2008, 2009-2012 and 2013-2017) and shows that funds provided positive returns in the first two subperiods, but negative average returns in the last. Nevertheless, we observe positive alphas for all the three sub-periods analyzed.

We also provide evidence in favor of performance persistence in our sample of funds. The return spreads between the top and bottom tercile performing funds obtained from the rank portfolio approach are consistently positive across several different subperiods, meaning that funds which outperformed in the past quarter tend to perform better than bottom funds in subsequent periods. Surprisingly, we find that even bottom funds yielded on average positive excess returns over the entire sample period across different holding periods.

Finally, the analysis of fund characteristics shows weak evidence that fund size is positively associated to positive alphas and yield inconclusive results about the effect of the expense ratio, the front-end and the back-end loading of funds.

These results open up areas for future research. Even though it has widely been recognized that the Carhart four-factor model is adequate in performance analysis, there are other factors that researchers have found that might explain returns better. There would also be room for the study of factors that could be important in particular to emerging market funds. In addition, in the persistence literature, it is possible to investigate performance persistence using more than one approach. This would further give insights into the robustness of persistence results in emerging market equity mutual funds.

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Table 1: Comparison of studies on emerging market mutual funds

This table shows the differences in methodologies and results between four developing market mutual fund papers. Column 1 gives the authors, Column 2 the number of funds, Column 3 the investigation period and time horizon in months, Column 4 the statistical methodology and Column 5 the results.

Authors	Number of Funds	Investigation Period (Time Horizon)	Statistical Methodology	Result
This paper (2018)	336	2005-2017 (1, 2, 3, 6, 12 months)	Performance: Fama-MacBeth regression of single-factor, Fama-French 3-factors, Carhart 4-factors model Persistence: Rank portfolio approach based on the single-factor model; Kolmogorov-Smirnov two-sided goodness-of-fit test	Performance: Statistically significant alphas Persistence: Short- and long-term performance persistence
Gottesman & Morey (2007)	58 (‘97), 83 (‘00), 74 (‘02)	1997-2005 (12 months)	Regression (not specified which kind)	Only expense ratio explains emerging markets equity mutual fund returns (in a negative way)
Huij & Post (2011)	137	1993-2006 (1 month)	Rank portfolio approach (based on different models)	Yes, 1-month short-term performance persistence
Basu & Huang-Jones (2015)	498	2000-2010 (3, 6 months)	Performance: Regression of single-factor and Fama-French 3-factors model Persistence: Rank portfolio approach based on single-factor model	Performance: No statistically significant alphas Persistence: Short-term performance persistence

Table 2: Descriptive statistics

This table shows the number of funds (Column 2) and the average fund sizes (Column 3). For the net returns, the table reports the respective minimum, maximum and median values (Columns 4-6) and the first four moments of return distribution (mean value, standard deviation, skewness, and excess kurtosis, Columns 7-10).

			Returns						
	Number of Funds	Ø Fund Size ($ million)	Min (%)	Max (%)	Median (%)	Mean (%)	SD (%)	Skewness	Kurtosis
All Funds	336	1192.93	-16.7	15.84	0.95	0.78	5.6	-0.19	3.82
Surviving Funds	176	1471.05	-16.7	15.84	0.99	0.78	5.28	-0.2	4.03
Non-Surviving Funds	160	535.95	-16.7	15.84	0.82	0.77	6.28	-0.16	3.35

Table 3: Summary statistics on fund characteristics

This table reports the expense ratios (subdivided into median, mean and standard deviation, Columns 2-4) and the turnover ratios (subdivided into median, mean and standard deviation, Columns 5-7), the front-end loadings (subdivided into median, mean and standard deviation, Columns 8-10) and the back-end loadings (subdivided into median, mean and standard deviation, Columns 11-13).

	Expense Ratio (%)			Turnover Ratio (%)		
Panel A	Median	Mean	SD	Median	Mean	SD
All Funds	1.32	1.35	0.41	57.00	70.95	59.65
Surviving Funds	1.26	1.26	0.37	51.00	66.82	60.55
Non-Surviving Funds	1.54	1.55	0.42	70.00	80.67	56.32
	Front-End Loading (%)			Back-End Loading (%)		
Panel B	Median	Mean	SD	Median	Mean	SD
All Funds	0.00	0.66	1.71	0.00	0.02	0.24
Surviving Funds	0.00	0.24	1.05	0.00	0.01	0.11
Non-Surviving Funds	0.00	1.65	2.41	0.00	0.04	0.41

Table 4: Performance of emerging market equity mutual funds and their benchmark

This table shows the monthly return statistics (Column 2) and Sharpe ratio statistics (Column 3) across the mean values, minimum values, maximum values, median values and standard deviations for the entire emerging market equity mutual fund sample (Panel A) and the MSCI EM IMI benchmark index (Panel B) over the full period (2005-2017).

Panel A: Emerging market mutual funds (n=336)		
	Monthly return (%)	Sharpe Ratio
Mean	0.78%	0.09
Minimum	-16.70%	-0.71
Maximum	15.84%	1.87
Median	0.95%	0.03
Standard Deviation	5.59%	0.22
Panel B: Performance of benchmark index (MSCI EM IMI)		
	Monthly return (%)	Sharpe Ratio
Mean	0.70%	0.10
Minimum	-27.80%	-0.23
Maximum	17.36%	0.64
Median	0.68%	0.03
Standard Deviation	6.37%	0.21

Table 5: Sub-period performance of funds and their benchmark

This table shows the monthly return statistics and Sharpe ratio statistics for the emerging market equity mutual fund across the mean values, minimum values, maximum values, median values, standard deviations and for the MSCI EM IMI for the sub-period of January 2005-December 2008 (Column 2 & 3), January 2009-December 2012 (Column 4 & 5) and January 2013-December 2017 (Column 6 & 7).

	2005-2008 (n=120)		2009-2012 (n=230)		2013-2017 (n=201)	
	Monthly return (%)	Sharpe Ratio	Monthly return (%)	Sharpe Ratio	Monthly return (%)	Sharpe Ratio
Mean	0.56%	0.31	1.52%	0.06	-0.10%	-0.01
Minimum	-16.70%	-0.65	-16.70%	-0.71	-16.11%	-0.63
Maximum	15.84%	1.22	15.84%	0.85	15.84%	1.87
Median	1.87%	0.33	0.71%	0.01	-0.09%	-0.03
Standard deviation	7.14%	0.19	6.79%	0.21	4.17%	0.17
MSCI EM IMI	0.38%	0.32	1.59%	0.08	-0.31%	-0.04

Table 6: Risk-adjusted coefficients of alpha and risk factors

This table reports the regression coefficients and t-statistics of the single-factor model (Column 1), the Fama-French model (Column 2) and the Carhart model (Column 3). Fund-clustered standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	(1)	(2)	(3)
Alpha	0.0021***	0.0014***	0.0016***
	(0.0003)	(0.0003)	(0.0003)
Rm-Rf	0.8952***	0.8936***	0.7898***
	(0.0107)	(0.0118)	(0.0222)
SMB		-0.0541***	-0.0671***
		(0.0176)	(0.0200)
HML		-0.1294***	-0.0559**
		(0.0271)	(0.0258)
MOM			0.1011***
			(0.0221)
N	18,219	18,159	18,159
R-Square	0.8743	0.9057	0.9149

Table 7: Sub-period analysis of risk-adjusted coefficients of alpha and risk factors

This table reports the regression coefficients and t-statistics of the capital asset pricing model (single-factor model, Columns 1, 4, 7), the Fama-French model (Column 2, 5, 8) and the Carhart model (Column 3, 6, 9) for the sub-periods of January 2005-December 2008 (Panel A), January 2009-December 2012 (Panel B) and January 2013-December 2017 (Panel C) and the respective R^2 values. Fund-clustered standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	Panel A (2005-2008)			Panel B (2009-2012)			Panel C (2013-2017)		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Alpha	0.0018***	0.0017**	0.0006	0.0014***	0.0020***	0.0018***	0.0016***	0.0011***	0.0016***
	(0.0007)	(0.0007)	(0.0006)	(0.0004)	(0.0005)	(0.0005)	(0.0004)	(0.0004)	(0.0003)
Rm-Rf	0.8841***	0.8839***	0.5579***	0.9376***	0.9327***	0.7543***	0.9145***	0.9120***	0.7722***
	(0.0159)	(0.0179)	(0.0289)	(0.0140)	(0.0167)	(0.0361)	(0.0139)	(0.0130)	(0.0249)
SMB		-0.1355***	-0.0650***		-0.0872***	-0.0526***		-0.0035	-0.0111
		(0.0255)	(0.0190)		(0.0195)	(0.0200)		(0.0253)	(0.0255)
HML		-0.0248	0.0166		-0.1381***	0.0463		-0.2328***	-0.1329***
		(0.0405)	(0.0453)		(0.0401)	(0.0404)		(0.0319)	(0.0296)
MOM			0.2880***			0.2033***			0.1397***
			(0.0274)			(0.0366)			(0.0202)
N	3,632	3,572	3,572	5,004	5,004	5,004	7,495	7,495	7,495
R2	0.9303	0.9427	0.9512	0.9330	0.9522	0.9598	0.8736	0.9093	0.9169

Table 8: Rank Portfolio Descriptive Statistics

This table shows the average excess return (monthly return over the risk-free rate, in %), the standard deviation and the Sharpe ratio for the terciles as well as the top and bottom three ninth of funds based on their past quarters performance for the holding periods of 1 month (Columns 1-3), 2 months (Columns 4-6), 3 months (Columns 7-9), 6 months (Columns 10-12) and 12 months (Columns 13-15).

	1 Month			2 Months			3 Months			6 Months			12 Months		
Portfolio	Excess Return (%)	Standard Deviation	Sharpe Ratio	Excess Return (%)	Standard Deviation	Sharpe Ratio	Excess Return (%)	Standard Deviation	Sharpe Ratio	Excess Return (%)	Standard Deviation	Sharpe Ratio	Excess Return (%)	Standard Deviation	Sharpe Ratio
1A	0.79%	0.05	0.15	1.69%	0.08	0.21	2.55%	0.10	0.25	4.74%	0.16	0.30	8.00%	0.23	0.35
1B	0.70%	0.06	0.13	1.38%	0.08	0.16	2.06%	0.11	0.19	4.40%	0.16	0.27	7.77%	0.24	0.33
1C	0.72%	0.06	0.13	1.45%	0.08	0.17	2.25%	0.11	0.21	4.34%	0.17	0.26	7.56%	0.24	0.31
1	0.77%	0.05	0.14	1.58%	0.08	0.19	2.41%	0.11	0.23	4.67%	0.16	0.29	7.95%	0.24	0.34
2	0.70%	0.06	0.12	1.40%	0.08	0.17	2.16%	0.11	0.20	4.28%	0.17	0.26	7.26%	0.24	0.30
3	0.73%	0.06	0.13	1.44%	0.08	0.17	2.12%	0.11	0.20	4.29%	0.17	0.26	7.84%	0.24	0.32
3A	0.71%	0.06	0.13	1.38%	0.08	0.17	2.09%	0.11	0.20	4.26%	0.17	0.25	7.27%	0.24	0.30
3B	0.67%	0.06	0.12	1.32%	0.08	0.16	1.94%	0.11	0.18	4.07%	0.16	0.25	7.53%	0.24	0.32
3C	0.80%	0.06	0.14	1.56%	0.09	0.18	2.20%	0.11	0.21	4.25%	0.17	0.25	8.41%	0.24	0.35
1A-3C Spread	-0.01%	0.00	0.01	0.13%	0.00	0.02	0.35%	0.00	0.04	0.49%	-0.01	0.05	-0.41%	-0.01	0.00
1-3 Spread	0.03%	0.00	0.01	0.14%	0.00	0.02	0.29%	0.00	0.03	0.38%	-0.01	0.03	0.11%	-0.01	0.01

Table 9: Risk-adjusted coefficients of alpha and fund characteristics

This table shows the regression results for the entire sample period January 2005-December 2017 (Column 1) and the sub-periods January 2005-December 2008 (Column 2), January 2009-December 2012 (Column 3) and January 2013-December 2017 (Column 4). *t* statistics in parentheses. Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	(1)	(2)	(3)	(4)
Intercept	-0.0001	-0.0177	0.0043	-0.0013
	(-0.06)	(-1.84)	(0.81)	(-1.06)
Expense Ratio	0.239**	0.772*	0.357	0.0158
	(2.64)	(2.24)	(1.55)	(0.23)
Turnover Ratio	0.0000567	-0.00405	0.00214	-0.000369
	(0.08)	(-1.22)	(1.43)	(-1.05)
Front-End Loading	-0.0176	-0.0124	0.0259	-0.0126
	(-0.96)	(-0.26)	(0.82)	(-0.68)
Back-End Loading	0.251***	0.384***	0.111	-0.197***
	(3.76)	(4.29)	(1.03)	(-5.43)
lnTNA	0.000715***	0.00194*	0.000760	0.0000736
	(3.62)	(2.01)	(1.51)	(0.59)
N	17,765	3,518	4,828	7,352
Number of funds	336	120	230	201
Adj. R-Square	0.000	0.003	0.000	-0.001