Mauro Aliano, Giuseppe Galloppo, Daniele Previati

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Mauro Aliano
DET Department, University of Rome Tor Vergata, Italy
Business and Economic Science Department, University of Cagliari, Italy

Giuseppe Galloppo
Ceis Foundation, University of Rome Tor Vergata, Italy
DEIM Department , University of Tuscia Viterbo, Italy

Daniele Previati
University of Roma Tre, Business Studies Department, Rome, Italy

Abstract

This paper investigates the relation between portfolio concentration and the performance of emerging market equity funds. We focus on Asian emerging markets finding that funds with higher levels of tracking error display lower performance than funds with less diversified portfolios. According to a study conducted previously, overall we found that the local factor market model provides quite a good representation of local average returns for portfolios formed on the basis of size and style factors. On the other hand unlike a number of other preceding studies, we find that Asian (excluding Japan) equity funds with higher levels of tracking error and more concentrated portfolios display lower performance than funds with less diversified portfolios. Moreover, as an additional analysis beyond what has been conducted in previous papers, we also tested the effects of the financial crisis, finding that the main result has not affected by it.

Keywords: Mutual funds; Multifactor model; Local factor; Performance evaluation.
JEL Codes: G11; G13; C58.

1 Introduction

For the past several decades, the investment performance of professional fund managers has been of considerable interest to both the academic and practitioner communities – this has been especially true over the last twenty years. Conventional wisdom and classical portfolio theory suggest that investors should widely diversify their holdings across industries to reduce their portfolios' idiosyncratic risk. Fund managers however, might want to hold concentrated portfolios if they believe some country areas, style of management or sectors, will outperform the overall market or a benchmark representing it. Indeed, skilled fund managers could have informational advantages in specific sectors,

Corresponding author: Giuseppe Galloppo, galloppo@unitus.it, giuseppe.galloppo@uniroma2.it, DEIM Department of Economics and Business, University of Tuscia, Via del Paradiso 47, 01100, Viterbo, Italy; CEIS Foundation, University of Roma Tor Vergata, Via Columbia 2, 00133, Roma, Italy.

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and they act to take advantage of this to achieve superior performance by holding more concentrated portfolios and selecting profitable stocks in specific sectors.

Lakonishok *et al.* (1994) find that more concentrated funds perform better after adjusting for risk and style differences using the four-factor model of Carhart (1997). Mutual funds with above-median industry concentration yield an average abnormal return of 1.58% per year before deducting expenses and 0.33% per year after deducting expenses, whereas mutual funds with below-median industry concentration, yield an average abnormal return of 0.36% before and −0.77% after expenses. They also confirm the relation between fund concentration and performance using panel regressions controlling for other fund characteristics.

In a more recent paper, Huij *et al.* (2011), starting from a dataset of global equity funds show that concentrated funds with higher levels of tracking error display better performance than their more broadly diversified counterparts. The relation between portfolio concentration and performance is mostly driven by the breadth of the underlying fund strategies not just by fund managers' willingness to take big bets. In addition to the theory of informational advantage, there are several other potential reasons as – ceteris paribus – portfolios with a greater degree of style consistency should produce superior returns. Following Brown *et al.* (2009), it is likely that more style-consistent funds exhibit both less portfolio turnover and transaction costs than funds that allow their style to drift. Moreover, regardless of dynamic turnover, managers who address their asset allocation decisions based on style factors closer to a declared benchmark are less likely to perform strategic and tactical asset allocation errors than those who try to pick stocks according to their own internal style decision process in the sense of Barberis and Shleifer (2003). Besides, as shown by Huang, Sialm and Zhang (2008), it is likely that managers, who act opportunistically, will end up changing the risk of their portfolios that then leads to a suboptimal performance. Furthermore, it is also likely that the investor community evaluates managers with consistent styles more accurately, that is, those who do not change their investment style from period to period. Ainsworth, Fong and Gallagher (2008) document that Australian equity fund managers appear to alter their security holdings specifically to avoid drifting too far away from their self-stated investment styles.

Fama and French (2012) examine four regions (North America, Europe, Japan, and the Asia Pacific), and they found that there are value premiums in average stock returns that, except for Japan, decrease with size. They also find that the integrated pricing region hypothesis is not supported by the results. One of the most remarkable research points of their work is the testing of the explanatory return power of local models that use local explanatory factors. Overall they find that the local factor market model provides passable descriptions of local average returns for portfolios that are formed based on size and value versus growth, but that they are less successful in tests on portfolios that are formed based on size and momentum. Finally according to Brown *et al.* (2009), it may also be true that fund managers have different capture ratios and that this skill is related to the style consistency decision.

To date, very little research has been conducted on whether portfolio concentration is related to fund performance in emerging markets, nor has much work been done on the topic of the impact of the crisis on the results. In a recent paper that compares US and Emerging Market mutual fund performance, Huij and Post (2011) document persistence in

the latter group. Moreover by applying the Carhart (1997) four-factor model that includes the momentum factor, the authors find that the contribution of winner funds is substantially larger for Emerging markets than for US funds. These winner funds generate returns that are both significant and large enough to cover management expenses verifying the view that emerging markets are less efficient than developed markets. They conclude that emerging markets represent good opportunities for active fund managers to find abnormal returns, although this evidence is limited to a test conducted using the Carhart (1997) model only. Białkowski *et al.* (2011), provide evidence on mutual fund performance for a sample of 140 funds in Poland. By applying a Carhart (1997) 4-factor asset-pricing model, the authors test whether emerging market inefficiency can provide fund managers the opportunity to apply good security selection and thus generate positive alpha. They also investigate whether Polish fund managers exhibit persistence in performance. Overall results suggest that Polish mutual funds on average are not able to add value. Eling *et al.* (2010), investigate mutual and hedge funds' performance in Emerging Markets. They use six performance measurement models to identify the return sources and the alpha generated by both types of funds. Results indicate that while some hedge funds generate positive and significant alpha, most mutual funds are not able to beat traditional benchmarks. Differences in obtaining over performance could be due to a higher degree of freedom that hedge funds enjoy in their investment style. Lim *et al.* (2011) find a positive relation between trade openness and informational efficiency for 23 developing stock markets, as more efficiency leads to more future firm profitability. About to the local factor, De Groot *et al.* (2012) document the relevance of value, momentum, and the local effects for emerging markets stock returns. Also for Cakici et. al (2013), local factors perform much better in emerging markets.

Using Asian (ex Japan) equity fund data from 2000 to 2012, we construct groups of funds with different concentration levels and we test the relation between style consistency and fund performance.

Unlike the aforementioned studies, we find that Asian (ex Japan) equity funds with higher levels of tracking error and more concentrated portfolios, display lower performance than funds with less diversified portfolios. This is found when we don't take into account specific concentration in holding in different multifactor style. We also check our results for financial crisis influence.

Our findings reveal that the relation between portfolio concentration and fund performance, is more complex than the one documented in earlier studies, and have significant implications for mutual fund investors. Indeed when investors are called upon to select the best-performing funds, they should take into account the tracking error level in particular.

The rest of the paper is organised as follows. In Section 2, we describe the data used in this study. Section 3 presents our empirical results. Section 4 provides concluding remarks.

2 Equity Fund Data

The database constructed for the study covers monthly returns for Asian markets with the exception of Japan. Our sample covers the period January 2000 to December 2012. Over this time span, our sample holds 670 observations for the Asian ex Japan Market.

Fama and French (2012) examining equity portfolios of four regions including Japan and Asia Pacific, found that local models exhibit explanatory power in predicting returns. We obtain return data on global equity funds from the Bloomberg financial database.

To estimate monthly loadings of a fund, 36 months of return data are required. This means that all funds in our study need to have at least 36 consecutive returns data and so we have to exclude funds that have not existed for more than three years. This criterion brings our sample to 418 for the Asian ex Japan market. For the first year in our sample, we have 1,355 monthly return observations. This number steadily increases to 4,967 observations in the final year of our sample. The average fund in our sample has a 9-year return history.

Regarding the effects that selection bias and survivorship bias, as described in Brown *et al.* (1992), could have on the results of this study, we think that this bias effect is likely to be insignificant. This was also found in the analysis of Huij (2011). Our return-based analysis includes all funds that existed during the sample period, so we expect that our results are sensitive neither to selection bias nor to survivorship bias.

In order to test that our sample of funds has a relatively wide breadth of investment opportunities, we compute variation in the funds' tracking errors. The average fund in our sample has a tracking error that is about −4.2% per year. As an element of innovation regard to previous works, we have checked the robustness of our findings also with regard to the financial crisis period as defined in Aït-Sahalia (2010; 2012).

3 Empirical Results: The Performance of Concentrated versus Diversified Funds

In accordance to the methodology as set out in Huij (2011a), we investigate the performance of concentrated versus diversified funds. The authors confirmed what several empirical studies have found on US mutual funds, namely that funds with concentrated holdings deliver superior performance with regard to funds exhibiting lower tracking error levels. This observation is consistent with the hypothesis that managers with superior information about specific market segments tend to take advantage from this fact and thus hold portfolios with relatively high concentration in those segments.

To see whether a positive relation between portfolio concentration and performance also exists for our sample of Emerging Asian markets equity funds, we run a market model analysis and rank funds with different levels of tracking error. In line with the literature, to take these different tracking error levels into account, we consider, the R-squared value from regressing fund returns relative to market returns as a measure of fund managers' skill to hold less diversified portfolios and to invest consistent amount of under management wealth on a small number of assets:

$$r_{i,t} = \alpha_i + \beta_{1,i} RMRF_t + \epsilon_{i,t} \tag{1}$$

where $r_{i,t}$ is the return of fund i at month t, and $RMRF_t$ is the excess return on the MSCI Emerging market (or Asian ex Japan) index at month t. The one-month T-bill rate from

Bloomberg is taken as a measure of the risk-free rate to compute excess returns. The market model in Eq. (1) is estimated for each fund based on the fund's entire return history.

We group funds according to how different the track error is in comparison to the benchmark MSCI. Funds showing a below-median R-squared value in this regression are considered as funds with relatively high levels of tracking error and they are grouped into the HIGH tracking-error group. According to this rationale, funds that have an above-median R-squared value are grouped into the LOW tracking-error group. The coefficient of determination (i.e., R-squared) is defined as $R_{SQ} = 1 - \sigma^2(e_j)/\sigma^2(R_j)$ and can be interpreted as the percentage of fund j's return variability due to the benchmark or fund's style decision for multifactor models.

Using the coefficient of determination in conjunction with a survivorship bias-free universe of mutual funds over the period January 1980 to December 2006, Brown *et al.* (2009) show that on average, those funds that are most consistent in their investment styles over time produce better absolute and relative performance than those funds that demonstrate less style consistency. The reasons for this higher performance were found to be that high style-consistent funds tend to have both lower portfolio turnover and lower expense ratios than funds that have low style consistency.

The goal of this paper is to test the relationship between concentration and performance. To evaluate fund performance, we take the intercept, known as Jensen's (1969) alpha, from the market model in Eq. (1). This intercept reflects the return of a portfolio of securities predicted by a market model, not due to its sensitivity to returns of a broad benchmark (i.e. the MSCI Emerging or Asian ex Japan market portfolio). To ensure that results are free from outliers bias, in accordance with Huij *et al.* (2011), we normalise fund alphas:

$$z\_alpha_i = \min\left(3, \max\left(-3, \frac{\alpha_i + \mu_\alpha}{\sigma_\alpha}\right)\right) \tag{2}$$

where μ_α is the average fund alpha obtained from the global market model and σ_α is the standard deviation.

Moreover, to take into account the fact that the error terms in Eq. (1) may not vary from one fund to another, we also introduce a modified version of Eq. (2), which incorporates fund-specific σ_ϵ as follows:

$$z\_alpha\_adj_i = \min\left(3, \max\left(-3, \frac{\frac{\alpha_i}{\sigma_{\epsilon,i}} + \mu_{\frac{\alpha}{\sigma_\epsilon}}}{\sigma_{\frac{\alpha}{\sigma_\epsilon}}}\right)\right). \tag{3}$$

where $\mu_{\frac{\alpha}{\sigma_\epsilon}}$ is the average ratio of funds' alphas divided by σ_ϵ and where $\sigma_{\frac{\alpha}{\sigma_\epsilon}}$ is the standard deviation. As the first step of the analysis, we evaluate the standardised alphas and adjusted alphas for the HIGH and LOW tracking-error groups.

Table 1: Tracking error and performance – Asian ex Japan Funds

	# Funds	Z_Alpha			z-adjusted			Rsq_Market
		Coefficient	t-statistic	p−Value	Coefficient	t-statistic	p-Value	
Panel A: Entire Sample 2000-2013								
Low	209	0.27	3.94	0	0.27	3.72	0	0.81
High	209	−0.28	−4.42	0	−0.31	−7.09	0	0.49
Panel B: Sample 2007-2013								
Low	208	0.19	2.65	0	0.19	2.64	0	0.84
High	208	−0.2	−3.09	0	−0.24	−5.29	0	0.54

Note: We measure portfolio concentration by taking the R-squared values from regressions of funds' excess returns on excess market returns:

$$r_{i,t} = \alpha_i + \beta_{1,t} RMRF_t + \epsilon_{i,t}$$

where $r_{i,t}$ is the return of fund i, and $RMRF_t$ is the excess return on the MSCI Emerging Markets index or on the MSCI Asian ex Japan index. We estimate Eq. (1) for each fund based on the fund's entire return history. Funds that have a below (above) median R-squared value in this regression are allocated to the HIGH (LOW) tracking-error group. To evaluate the performance of the funds, we take the intercept from Eq. (1). In addition, we adjust alphas by dividing them by the standard deviation of the fund's residual returns as derived from Eq. (1). We present normalised alphas and adjusted alphas of HIGH and LOW tracking-error groups, along with respective t-statistics and p-values, based on the full-sample period as well as sub periods (2000-2012 and 2007-2012). In addition, we report the groups' average R-squared from the market model (Rsq_Market).

Source: Developed by the authors.

The results are depicted in Panel A, Table 1. It appears that HIGH tracking-error funds have a relatively higher standardised alpha compared to LOW tracking-error funds: 0.27 versus 0.28 for the Asian ex Japan market. Given the way in which the subgroups were segregated it is not surprising that HIGH tracking-error funds have a lower R-squared from the market model regression, compared to LOW tracking-error funds. The conclusions about the relation between concentration and performance remain unaffected when we measure fund performance using the adjusted alpha: LOW tracking-error funds have a superior standardised adjusted alpha when compared to HIGH tracking-error funds, 0.27 versus 0.31 for the Asian ex Japan market. The results are also statistically significant, apart from the performance measure we consider. That being said, these results are not in the line with the findings of Huij *et al.* (2011a), Kacperczyk *et al.* (2005), Baks *et al.* (2006), Cremers and Petajisto (2009) and Amihud and Goyenko (2009) and they do not support the hypothesis that fund managers who take big bets and hold more concentrated portfolios could perform better than passive managers by holding more diversified portfolios. Evidence that Emerging Market Fund Managers are not able to add positive alpha to a fund's overall return are described by Białkowski *et al.* (2011), and Eling *et al.* (2010).

In a recent study Fama and French (2012) found on Asia-Pacific equity portfolios, statistically significant negative Jensen' alphas by running multifactor return regression models when data are double ranked for size and book to market value.

We repeat our analysis in order to verify the effect of the crisis period (sub periods June 2007 to December 2012). The results are presented in Panel B of Table 1. The standardised alphas for the LOW and HIGH tracking-error groups are −0.20 and 0.19

Low and High groups cut points		Alpha mean Market Model	Low vs High
First decile	Low	0.72	0.80
	Hi	−0.08	
Second decile	Low	0.53	0.66
	Hi	−0.13	
Third decile	Low	0.35	0.51
	Hi	−0.15	
Fourth decile	Low	0.31	0.53
	Hi	−0.21	
Fifth decile	Low	0.28	0.57
	Hi	−0.29	
Sixth decile	Low	0.19	0.47
	Hi	−0.29	
Seventh decile	Low	0.17	0.57
	Hi	−0.40	
Eighth decile	Low	0.13	0.69
	Hi	−0.56	
Ninth decile	Low	0.06	0.66
	Hi	−0.60	

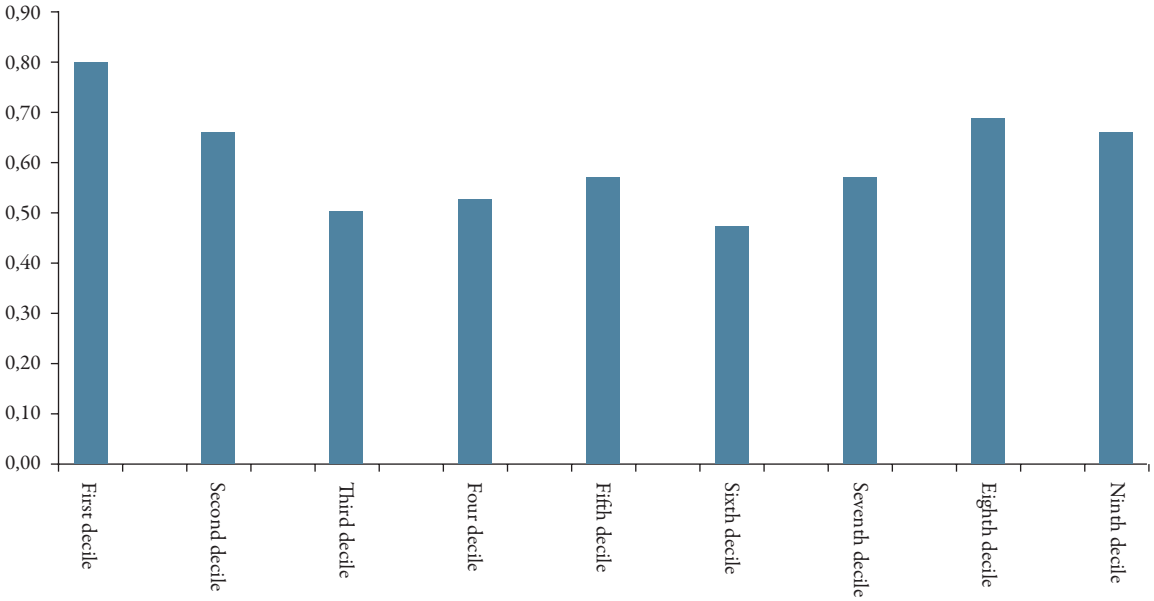

Figure 1: HIGH and LOW tracking-error Groups Different Cutting Point – Market Model Alpha – Asian ex Japan Funds.

Source: Authors' calculations.

for the Asian ex Japan market for the first sub period. When we consider the groups' standardised adjusted alphas, we find similar results. All results are highly statistically significant for both markets. Therefore we can say that the crisis does not appear to affect the basic relationship between performance and fund concentration. Moreover, to better understand soundness with regard to the fact that Fund Managers with active management style are not able to add positive alpha, we have considered different cut points other than the median in a single factor model (or portfolio model) context. Indeed in Figure 1 we represent, for the market model, High and Low group alpha means, calculated taking into account different decile cutting points. The results exhibit very clearly that, whether or not we make a choice about a specific cut point, funds with low

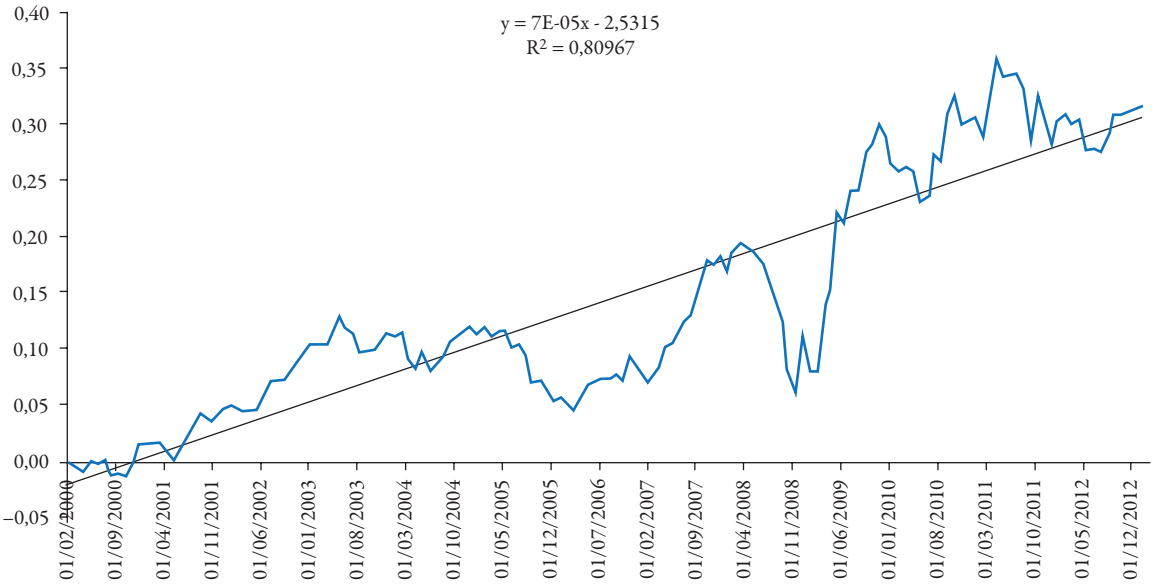

Figure 2: Cumulative return differences between HIGH and LOW tracking-error funds – Asian ex Japan Funds.

Source: Authors' calculations.

tracking error from a declared benchmark show better performance than High tracking error Funds, when we measure economic results in terms of the Jensen alpha. To the best of our knowledge this is the first time that this simple robustness test is carried out in the literature.

Figure 2 shows the cumulative return spread between LOW and HIGH tracking-error groups over time. This measure is computed month by month, to see whether the observed performance differences between these groups of funds are concentrated in a specific sub period. For the Asian ex Japan market, figures relating to all periods, except for the sub period 2006 to 2008, show a clear upward trend across the sample that is not concentrated in any specific sub period. It appears that funds with higher levels of tracking error systematically display better performance than funds with lower levels. To investigate homogeneity assumptions made about the error terms in Eq. (1), we also display the distributions of standardised alphas for the HIGH and LOW tracking-error groups in Figure 3. This distribution points out that the mean alpha differs among groups, as does the variance of alpha. The variance in alphas of HIGH tracking-error funds is larger than that for LOW tracking-error funds. The t-test for differences in means results in unequal variances and points out that the relation between concentration and performance is robust relating to the homogeneity assumption.

4 Summary and Concluding Remarks

Unlike previous studies that are exclusively based on the US and Global mutual fund market segments, in this paper we have tested the relationship between equity fund performance and holding concentration of Asian Emerging markets. To summarise in

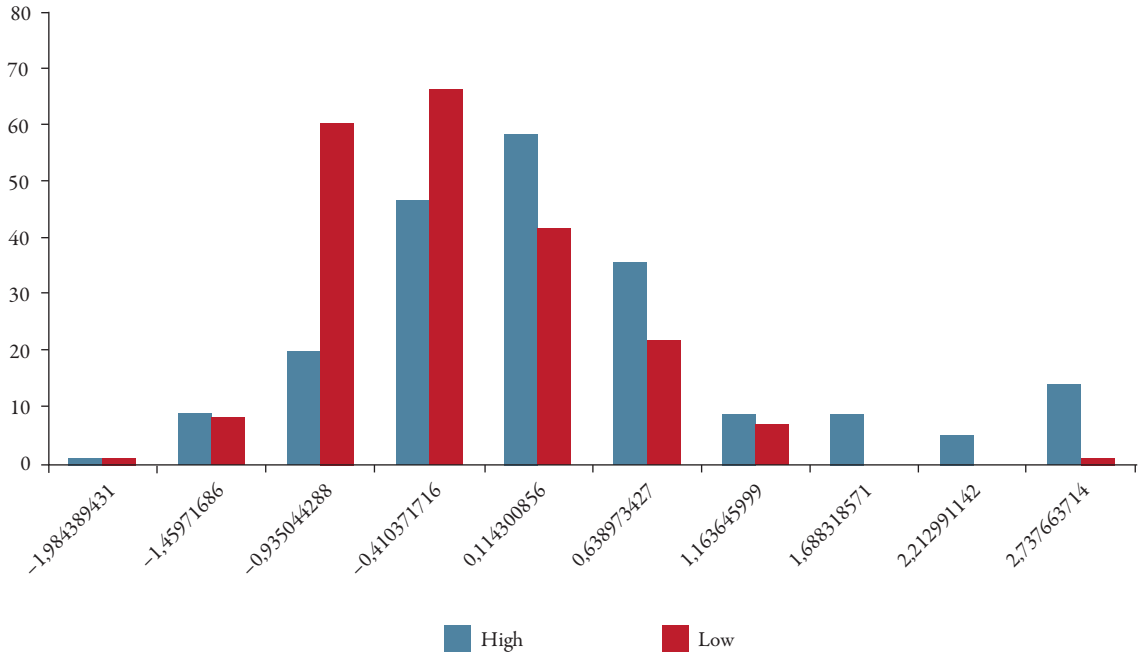

Figure 3: Histogram of performance of HIGH and LOW tracking-error funds – Asian exJapan Funds.

Source: Authors' calculations.

terms of contribution to the literature, we have studied emerging market funds from the perspective of active management in line with the work of Fama and French (2012) about the explanatory power of local models in predicting fund returns. We also examined the effect that the most recent financial crisis has had on this relationship. Amazingly enough, evidence indicates that the relationship between concentration and performance, with regard to tracking error level is exactly the opposite to what has been found in previous studies – i.e. greater concentration, measured in terms of tracking error and adjusted R-squared, is coupled with higher performance as measured by Jensen's Alpha. Empirical evidence from US equity mutual funds suggests that fund managers who are willing to take big bets and hold more concentrated portfolios display better performance than managers who hold more broadly diversified portfolios. Moreover, as an additional analysis with respect to the majority of previous papers in this specific area, we also tested the effects of the financial crisis: overall we have found that the main result has not been affected by it.

The research findings of this work have implications for the asset allocation process for both professional fund managers and private investors. When investors are called upon to select the best-performing funds, they should take into account the overall tracking error level very carefully.

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