An empirical examination of the diversification value provided by regional mutual funds

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Abstract

In this project I examine three samples of U.S.-based regional mutual funds: Asia-Pacific, European, and Latin American, to examine whether higher level of fund diversification translate into higher diversification value to fund shareholders. To measure mutual funds' level of portfolio diversification, I implement a modified version of the Herfindahl index. In order to measure the diversification value provided to fund shareholders, I use a methodology which takes into consideration the Sharpe ratio of the fund and its correlation with existent portfolios. Asia-Pacific funds are found to be the most diversified, while European funds provide the highest level of diversification to fund shareholders. The relation between fund diversification and diversification value is positive only in the case of Asia-Pacific funds.

Keywords: regional mutual funds; diversification value; Herfindahl index

Introduction

Academic publications as well as business press articles praise the value of international diversification. Early studies show that U.S. investors can attain large diversification benefits by investing in emerging markets (Harvey, 1995), multinational firms (Rowland and Tesar, 1998) and country funds and American depositary receipts (Errunza, Hogan and Hung, 1999). Although, with higher markets integration and the abolishment of many investment barriers, international diversification benefits have deceased over time (You & Daigler, 2010), Driessen and Laeven (2007) show that there are still benefits for investors currently investing in their local equity market. And they show that, benefits come from investing outside the region of the home country and are larger for countries with high country risk. Chiou (2009) shows that, even after controlling for portfolio constraints, there is potential economic value from international investing.

In their quest for international diversification, U.S. investors can access international markets by investing directly in securities issued by foreign corporations. However, this might not

be the most cost effective way for most investors, given the amount of capital needed to adequately diversify their portfolios across many investment in the region. Additionally, some foreign markets are not even available to individual investors. Investors can also invest indirectly in foreign market through investment companies. The four most common investment companies in the U.S. are open-end mutual funds, exchange traded funds, closed-end mutual funds, and unit investment trusts. By far, the most popular of the four are open-end mutual funds. The Investment Company Institute (ICI) in his 2014 Annual Report states that total net assets in mutual funds amounted to more than $15 trillion. In comparison, assets in exchange traded funds, closed-end mutual funds, and unit investment trust were: $1.7 trillion, $279 billion, and $87 billion, respectively. In fact, 46.3 percent of all U.S. households owned open-end mutual funds. Giving this information, it is only natural to think that U.S.-based international open-end mutual funds are one of the most important investment vehicles for U.S. investors to gain access to international markets. Recent figures show that this might be the case. In 2013 international mutual funds' assets reached $2.1 trillion or 14 percent of the total assets of the U.S. mutual fund industry.

U.S.-based international mutual funds include, geographically speaking, well-diversified funds as well as strictly constrained funds. For example, foreign funds invest mostly in foreign securities from around the world while maintaining a limited amount of their assets in the U.S., whereas regional funds manage a portfolio restricted to include securities only from one specific geographical region. Regional mutual funds normally invest at least 80% of their portfolios in securities from a certain geographical area. An issue not overly addressed in the mutual fund literature, and the central point of this study, is the analysis of the diversification value provided to fund shareholders by regional funds. In addition to good performance, an investor might benefit from adding a mutual fund to his current portfolio if the new fund increases the investor's overall

diversification. The higher the diversification, the smoother or less volatile the investor's overall investment portfolio returns will be. I examine the diversification provided of regional mutual funds that invests in the geographical regions of Asia-Pacific, Europe, and Latin America. I examine the diversification value of U.S.-based regional mutual funds that invest in three foreign regions: Asia-Pacific, Europe and Latin America. I study the level of diversification of these funds by analyzing their exposure across countries in the region and examine whether funds diversification levels benefit funds shareholders. That is, do higher levels of portfolio diversification at the fund level translate into better diversification to fund shareholders? To the best of my knowledge, this is an issue not yet addressed in the literature on U.S.-based regional mutual funds.

Brief literature review

The literature on U.S.-based regional mutual funds is very limited. Some studies on the risk-adjusted performance of U.S.-based international mutual funds, include regional funds as one of the sample of funds[1]. Recent accounts include: Babalos, Mamatzakis, and Matousek (2015) and Basu and Huang-Jones (2015). Regarding European funds, previous literature is limited to a few studies that are solely devoted to these funds (i.e., Engstrom (2000), Pushner, Rainish, and Coogan (2001), Papadamou and Stephanides (2004), and Rodriguez (2007)). Engstrom (2000) examines the diversification value of European mutual funds and shows that international investors benefit from including these funds in their portfolios. Pushner, Rainish, and Coogan (2001) evaluate European fund performance during the 1986-1998 time period and find that their sample underperform the MSCI European Index. In a more recent study, Papadamou and Stephanides

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[1] A good example is Tkac (2001).

(2004) examine European mutual funds from a risk management perspective. They implement various versions of the Value at Risk (VAR) and expected tail loss models and find that the efficacy of either model depends mostly on the particular investing style of the fund. Rodriguez (2007) examines the forecasting ability of European mutual funds by examining attribution returns. The author finds evidence of positive performance and good forecasting skill.

A good number of studies on emerging markets mutual funds include Latin American funds as part of their sample (see for example: Borensztein and Gelos (2003), and Kaminsky, Lyons, and Schumukler (2001)). One of the few papers solely devoted to these mutual funds is Kaminsky, Lyons, and Schumukler (2004). The authors analyze a sample of open-end Latin American mutual funds and present evidence of momentum trading by both investors and fund managers. They also find evidence of contagion trading, i.e., the systematic selling (buying) of stocks in one country when the stock market falls (rises) in another. Rodriguez (2007) examines the forecasting ability of U.S.-based Latin American funds during the 1999-2003 time period. The author reports that these funds show good forecasting ability and positive risk-adjusted performance. However, during times of crises forecasting ability is poor. There are even fewer articles that only examine Asia-Pacific mutual funds. DeMasky, Dellva, and Heck (2003) look at the efficiency and effectives of hedging currency risk by U.S.-based Asia-Pacific funds, and show that hedging improves the risk-adjusted performance of these funds.

Data and methodology

Data

The focus of this study is on the diversification value of U.S.-based Asia-Pacific, European, and Latin American mutual funds during the 2004-2014 time period. The samples include funds classified as Asia-Pacific, European, and Latin American mutual funds in the Center for Research

in Security Prices Survivorship-Bias-Free U.S. Mutual Fund Database (CRSP). Monthly returns as well as fund characteristics are also from CRSP. For fund families with multiple classes of the same fund, that is same portfolio, only the fund class with the longest history will be included in the sample. To be included in the study, a fund must have at least 36 consecutive months of return data. To avoid the survivorship bias problems presented in Elton, Gruber and Blake (1996) all surviving and non-surviving funds are included in all the analyses.

Table 1 provides some descriptive statistics of the mutual funds included in the study. The sample of US-based regional mutual funds examined in this study includes: 21 Asia-Pacific funds, 31 European funds, and 11 funds from Latin America. Based on median values, the sample of funds which is larger in terms of total net assets are the European funds with a median size of 107.7 million, followed by Asia-Pacific (36.43 million) and Latin American (27.14 million). In terms of expense ratio, Latin American funds have the largest median value with 1.64 percent, followed by Asia-Pacific (1.58 Percent), and Europe (1.49 percent). If we compare the samples of funds based on the median turnover ratio, the order is: Europe (88.3 percent), Asia-Pacific (74.2 percent), and Latin America (53.6 percent).

In order to estimate the different metrics employed in this study it is necessary to have access to monthly returns of country indexes. In that regard I turn to data provided by Morgan Stanley Capital International Index (MSCI), and accessed through Bloomberg. In the end, a total of 29 MSCI country indexes are included in the analysis that follows. To estimate the cash portion of the funds' portfolios, I use the Fama-French risk-free rate.[2] For each region, the risk free rate is included as a representation of the cash holding of the fund.

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[2] Available in http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

Methodology

To measure mutual funds' level of portfolio diversification across countries in the region, I implement a modified version of the Herfindahl index (Woerheide and Persson, 1993). Out of five different metrics used by Woerheide and Persson (1993) to measure the degree of diversification of unevenly distributed stock portfolios, the Herfindahl index was found to be the most effective. Although mostly used to measure the concentration of companies in an industry, the Herfindahl index have proved to be a very versatile tool. For example, Hayden, Porath and Westernhagen (2007) use it to measure the degree of diversification of portfolios of individual loans of German banks, and more recently Cressy, Malipiero and Murani (2014) use it to examine the portfolios of venture capital firms. The modified version of the Herfindahl index used here is defined as:

$$DI = 1 - HI = 1 - \sum_{i=1}^{n} w_i^2$$

Where, *DI* stands for diversification index or a measure of the diversification level of the mutual fund, *HI* stands for Herfindahl index, and the *w* are the exposure to each country in the region where the fund invest. *DI* ranges between zero and one, the larger the value the larger the diversification level of the fund.

I use Sharpe's (1992) style analysis to estimate portfolio exposure to the countries in each geographical region from the publicly available daily fund returns.

To implement Sharpe's style analysis, it is assumed that fund returns can be expressed as:

$$r_i = \sum_{j=1}^{n} w_{i,j} r_j + e_i \tag{1}$$

Where:

r_i : is the total return of fund i

$w_{i,j}$: is the exposure of fund i to country index j

r_j : is the total return of country index j

e_i : is the unexplained component of fund return

The portfolio weights are the solution of a quadratic programming problem; these weights represent factor loadings on an index strategy that does the best job explaining the fund's return:

$$\text{Min}\left[\text{var}\left(r_i - \sum_{j=1}^{n} w_{i,j} r_j\right)\right] \tag{2}$$

subject to

$$1 \le w_{i,j} \le 0 \quad \forall j$$

$$\sum_{j=1}^{n} w_{i,j} = 1$$

Style analysis has been an important tool in examining the value of active fund management[3]. The countries included in the style analysis are countries included in each MSCI regional index. For the Asia-Pacific region the countries are: Australia, China, Hong Kong, India, Indonesia, Japan, Malaysia, New Zealand, Singapore, South Africa, South Korea, Taiwan, and Thailand. For the

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[3] Examples include Dor et al. (2003), Comer (2006) and Rodríguez (2008).

European region the countries are: Austria, Belgium, Denmark, France, Germany, Italy, Spain, Sweden, Switzerland, and the United Kingdom. Finally, form Latin America the countries are: Argentina, Brazil, Chile, Colombia, Mexico, and Peru

Once portfolio diversification is estimated at the fund level, I examine the diversification value provided to funds' shareholders. In order to do that, I use a methodology first introduced in Elton, Gruber, and Rentzler (1987). The basic idea behind the approach applied by Elton et al. (1987) is that a mutual fund should be added to an existing portfolio if the Sharpe ratio of the fund is higher than the product of the return correlation of the mutual fund and the existing portfolio and the Sharpe ratio of the existing portfolio. That is, a mutual fund should be added to an existent portfolio if the following condition holds:

$$\frac{\overline{r_i} - r_f}{\sigma_i} > \left(\frac{\overline{r_P} - \overline{r_i}}{\sigma_P}\right)\rho_{iP} \tag{3}$$

where:

$\overline{r_i}$ is the fund's average monthly return,

r_f is the monthly risk free rate,

σ_i is the standard deviation of fund F,

$\overline{r_P}$ is the average monthly return of the existing portfolio,

σ_P is the standard deviation of portfolio P,

and ρ_{iP} is the correlation coefficient between fund i and portfolio P.

I measure the diversification value provided to fund shareholders as the difference between the ratios (left minus right).

Polwitoon and Tawatnuntachai (2006) and Shen, Lu, and Lin (2010) also examined mutual funds' diversification value by implementing Elton et al. (1987) methodology. The former examined global bond funds, whereas the later examined international real estate mutual funds. To measure the incremental diversification benefits of regional funds, I follow the approach of Polwitoon and Tawatnuntachai (2006) and use index funds to represent typical portfolios of U.S. mutual fund investors. Index funds, rather than index benchmarks, better proxy for investors' portfolios as funds account for expenses. To measure the existent portfolio of a typical U.S. investor I use the Vanguard 500 index mutual fund.

Empirical Results

As a first step in the analysis, the funds exposure to all the countries in each region are estimated. The time period runs from January 2004 to December 2014. Table 2 shows average exposure to the countries in each region. Panel A of Table 2 shows the average exposure for the Asia-Pacific funds. These funds have the highest exposure to Japan (14.08 percent), followed by Hong Kong (13.93 percent), and Thailand (13.86 percent). Panel B presents the average exposure of European funds. The three countries with the highest exposures are: UK (23.56 percent), Germany (23.13 percent), and Austria (20.64 percent). Finally, Panel C of Table 3 shows the exposure to the Latin American countries. Countries with the highest exposure in the Latin American region are: Brazil (48.47 percent), Mexico (28.85 percent), and Colombia (6.16 percent). The table includes the adjusted R2 for the Sharpe procedure and in all three cases the model worked well, as it explains between 92 and 99 of the return variation of regional mutual funds.

I know turn to the central point of the study. The diversification degree of regional mutual funds is estimated using a modified version of the Herfindahl index. Table 3 shows descriptive

statistics of both, the funds diversification level and the diversification value provided to fund shareholders. Panel A of Table 3 shows the result for the sample of 21 Asia-Pacific funds. The degree of portfolio diversification for Asia-Pacific funds is high. The average and median *DI* (diversification index) are 0.8193 and 0.8237, respectively. However, the average level of diversification value provided to fund shareholders is -0.0359. Meaning that, on average Asia-Pacific funds failed to provide diversification value to shareholders. Moreover, only 9 funds provided diversification value to fund shareholders. That is, 9 funds have a positive Elton et al. difference (Equation 3). Finally, we find a low, but positive, correlation (0.3214) between the degree of fund diversification and the diversification value provided to Asia-Pacific shareholders during the sample period. That, is high diversification at the fund level translate to more diversification value to fund shareholders.

The results for the 31 European funds are presented in Panel B of Table 3. The average and median fund diversification are 0.737 and 0.7518, respectively. As a group, European funds did offer diversification value, as the average diversification value to fund shareholders is 0.0086. Also, 15 out of 31 European funds attain a positive Elton et al. measure of diversification. However, I find that high fund diversification means lower diversification value to fund shareholders, as the correlation between these two measures is -0.1425.

Finally, Panel C shows the results for the Latin American mutual funds. The average fund diversification (DI) is 0.6005, while the median is 0.5848. In terms of diversification value to fund shareholders, Latin American funds fell short. The average Elton et al. measure is -0.1157, and only 5 individual funds provided diversification value to fund shareholders. As with the case with European funds, the relation between fund diversification and diversification value to fund shareholders is negative. The correlation between these two measures is -0.612.

Conclusion

This study examines the diversification value of three sample of US-based regional mutual funds, and the diversification value these funds provided to fund shareholders. To measure the diversification level of the funds, a modified version of the Herfindahl index is used; whereas the diversification value provided to fund shareholders is based on Elton et al. (1987) methodology. Results show that Asia-Pacific funds have the highest level of portfolio diversification, but fail to provide diversification value to fund shareholders. Nevertheless, the relation between fund diversification degree and diversification value provided to fund shareholders is positive. In the case of European funds, the degree of fund diversification is lower than that of Asia-Pacific funds, but the diversification value provided to fund shareholders is higher. However, the relation between the two is negative. Latin American funds are found to be the less diversified group of funds. Also, and similar to Asia-Pacific funds, these funds fail to provide diversification value to fund shareholders. And as it is found for European funds, in the case of Latin American funds higher levels of fund diversification are associated with lower diversification value to fund shareholders.

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Table 1: Fund samples descriptive statistics

Panel A: Asia-Pacific (21 funds)

	Mean	Std. Dev.	Median	Minimum	Maximum
Total net assets	309.3438	606.2064	36.4375	0.675	2423.264
Expense Ratio	0.016353	0.00478	0.015763	0.009045	0.0252
Turnover Ratio	0.758445	0.421624	0.741818	0.17625	1.774286

Panel B: Europe (31 funds)

	Mean	Std. Dev.	Median	Minimum	Maximum
Total net assets	281.0163	447.7072	107.7	2.15	2178.618
Expense Ratio	0.014872	0.004424	0.014855	0.00845	0.027455
Turnover Ratio	1.108156	1.333749	0.882727	0.05625	7.78

Panel C: Latin America (11 funds)

	Mean	Std. Dev.	Median	Minimum	Maximum
Total net assets	508.214	913.5466	27.14	0.733333	2701.473
Expense Ratio	0.016319	0.003048	0.016433	0.010545	0.022075
Turnover Ratio	0.680472	0.577336	0.536364	0.103333	2.27

Table 2: Mutual funds country exposure

Panel A: Asia-Pacific		Panel B: Europe		Panel C: Latin America	
Country	Exposure	Country	Exposure	Country	Exposure
Australia	6.44%	Austria	20.64%	Argentina	1.01%
China	11.46%	Belgium	4.93%	Brazil	48.47%
Hong Kong	13.93%	Denmark	1.00%	Chile	5.87%
India	4.29%	France	3.40%	Colombia	6.16%
Indonesia	6.95%	Germany	23.13%	Mexico	28.85%
Japan	14.08%	Italy	2.18%	Peru	3.59%
Malaysia	0.56%	Spain	12.47%	Cash	6.05%
New Zealand	0.00%	Sweden	6.87%		
Singapore	10.71%	Switzerland	0.00%		
South Africa	6.65%	United Kingdom	23.56%		
South Korea	3.90%	Cash	1.81%		
Taiwan	5.49%				
Thailand	13.86%				
Cash	1.67%				
Ave. Adjusted r2	0.95	Ave. Adjusted r2	0.92	Ave. Adjusted r2	0.99

Table 3: Mutual fund diversification and diversification value to investors

Panel A: Asia-Pacific (21 funds)

	Mean	Std. Dev.	Median	Minimum	Maximum
Fund Diversification	0.8193	0.0612	0.8237	0.6474	0.8868
Diversification Value	-0.0359	0.1156	-0.0203	-0.2686	0.2359
Correlation	0.3214				

Panel B: Europe (31 funds)

	Mean	Std. Dev.	Median	Minimum	Maximum
Fund Diversification	0.7370	0.0625	0.7518	0.5020	0.8344
Diversification Value	0.0086	0.0985	-0.0051	-0.2011	0.2538
Correlation	-0.1425				

Panel B: Latin America (11 funds)

	Mean	Std. Dev.	Median	Minimum	Maximum
Fund Diversification	0.6005	0.0843	0.5848	0.4916	0.7368
Diversification Value	-0.1157	0.2090	-0.0501	-0.4522	0.2182
Correlation	-0.6120				