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MUTUAL FUND FLOW-PERFORMANCE RELATIONSHIP: THE ROLE OF A FOREIGN PARENT

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Abstract:

In this paper we use a worldwide sample, including 31 countries, to test the influence of funds with a foreign parent on the flow-performance relationship. We study the reason behind the distinction in the way investors in different countries favor fund parents. We find that the flow-performance relationship is convex, consistent with previous studies using a worldwide sample. We also find that funds with foreign parents increase the convexity of fund flow to performance; in other words, investors buy more winners and sell less losers when funds have a foreign parent. The results also show that the enhanced convexity in funds with foreign parents is more pronounced in countries with less developed economies and financial markets, and where investors are less sophisticated.

Keywords: Mutual funds, Flow-performance relationship, Convexity, Fund with foreign parent, Investor sophistication

JEL code: G15, G23

Resumo

Neste estudo, utilizamos uma amostra que inclui 31 países de diferentes regiões do mundo, para testar o impacto na relação fluxo-performance que decorre de um fundo de investimento ter um parente estrangeiro. Os nossos resultados confirmam que a relação fluxo-performance é convexa, consistente com estudos anteriores usando uma amostra semelhante. Também constatamos que os fundos com parentes estrangeiros apresentam uma maior convexidade; ou seja, os investidores investem mais em fundos com uma boa performance e vendem menos fundos com pior performance, sempre que existe um parente estrangeiro. Os resultados mostram ainda que a maior convexidade nos fundos com parentes estrangeiros é mais pronunciada em países com economias e mercados financeiros menos desenvolvidas e onde os investidores são menos sofisticados.

Palavras-chave: Fundos de investimento, Relação Fluxo-performance, Convexidade, Fundos com parentes estrangeiros, Sofisticação do investidor

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1. Introduction

In the last two decades, the role of mutual funds in the financial markets has increased considerably. The world's financial asset managed in the mutual fund industry has grown 400 percent from $6.1trillion in 1996 to $24.6 trillion in 2010 (European Fund and Asset Management Association (EFAMA) and the Investment Company Institute (ICI) 2010). The number of mutual funds also increased dramatically to 69,000 funds worldwide at the end of 2010 (27,754 equity funds). The US has the largest amount of financial assets invested in mutual funds around world. However, whereas the assets in the US doubled from 1996 to 2010, the growth in countries outside the US exceeded 400 percent which demonstrates the rapid rate of development of the mutual fund industry in other countries.

Due to this rapid growth, the literature on mutual funds has increased significantly and many papers have addressed the subject of the mutual fund flow-performance relationship. Studies on the relationship between fund flow and performance go back nearly twenty years. The US market was the focus of most research in the early years not only due to rapid development of mutual funds there but also because of the large amount of assets invested in the mutual fund area. Chevalier and Ellison ,1997., Sirri and Tufano ,1998., and Huang, Wei, and Yan (2007) use US data to show a convex relationship between fund performance and flow which suggests investors tend to buy funds that perform well but fail to sell poorly performing funds. However, more recent research by Kim (2010), and Spiegel and Zhang (2013), for example, have shown a linear relationship between flows and performance. Ferreira, Keswani, Miguel, and Ramos (2012) use a worldwide sample to analyze the flow-performance relationship and find there is more convexity in less developed countries. In other words, investors in more developed countries tend to sell

more "loser" funds in terms of historical performance and buy fewer "winner" funds. Some papers dig deeper to study factors that can influence the sensitivity of flows to fund performance. For example, Sirri and Tufano (1998) and Huang, Wei, and Yan (2007) demonstrate the relationship between the fund participant fee and flow-performance sensitivity.

Our paper will follow previous studies by making a deeper analysis of the relationship between mutual fund flow and performance, using three different measurements of this relationship (linear, two-piecewise linear, and three-piecewise linear). Our main goal is to test whether the nationality of the fund parent influences how investors react to past performance, i.e., influence the flow-performance sensitivity. This study will fill a gap in the literature as, to our knowledge there are no studies addressing the role of fund parents on how investors react to past performance.

We will start by studying the effect of having a foreign parent on the flow-performance relationship and, our first hypothesis is that funds with a foreign parent are expected to have greater convexity on the flow-performance relationship.

Ferreira et al. (2012) have already demonstrated that, countries with less economic and financial development, and where the mutual fund industry is less developed, have greater mutual fund flow-performance convexity. In these countries, mutual fund investors are regarded as less sophisticated and buy more funds that perform well and react less to poor performers. We believe that in these countries, investors will regard mutual funds with a foreign parent as a stamp. An attribute that less sophisticated investors will value more. Having a foreign parent is, therefore expected to increase even more the convexity of the flow-performance relationship for these investors. This is our second hypothesis.

Like Ferreira et al. (2012), we use an international dataset, covering mutual funds from 31 countries around the world from the Lipper Hindsight database. Also consistent with Ferreira et al. (2012), we first find that the flow-performance relationship is convex. To test the hypothesis of the effect of foreign parents on the flow-performance relationship, we then interact fund's past performance with a dummy variable that takes the value of one if the fund has a foreign parent and zero otherwise. The results show that having a foreign parent has an impact on how mutual fund investors react to past performance.

We then test the second hypothesis that investors from more developed countries invest less in fund with foreign parents, while those from less developed countries invest more. We follow Ferreira et al. (2012) using proxies for the financial, economic and mutual fund industry development to evaluate the reactions of investors from countries with different levels of development to funds with foreign parents. We find that the greater the level of economic, financial, and mutual fund industry development in a region, the less investor put their money in funds with foreign parents. We also show our results are robust by using a different performance measures including raw return, one factor alpha and four factors alpha and we obtain a similar results.

This paper makes different contributions to the mutual fund literature. First, we study the flow-performance relationship using a worldwide sample as not many studies use non-US data. Secondly, to the best of our knowledge we are the first to study the effect of fund parents on the flow-performance relationship. Our results suggest that funds with foreign parents enhance the convexity of fund flow to performance. Finally, we give more detailed country-level information to compare how investors from different countries, in which the

development of the economic, financial, and mutual fund industry varies, react to funds with a foreign parent.

The rest of the paper is structured as follows. The next section presents the literature review. Section 3 describes the dataset. Section 4 addresses methodology. Section 5 present empirical results. Section 6 shows robustness test. Section 7 concludes.

2. Literature review

There are many studies on the flow-performance relationship. Most research concludes that fund flow is highly dependent on the fund's performance; this suggests that good performers would attract more investors, and vice versa. More in-depth research has been conducted on the fund flow-performance relationship mainly from three aspects. Firstly, the specific shape of the fund flow and performance; for example, while some studies show that the flow-performance relationship is linear (e.g. Kim, 2010. Spiegel and Zhang, 2013),the vast majority, find that the flow-performance relationship is convex (e.g. Chevalier and Ellison ,1997),. Sirri and Tufano ,1998, and Huang, Wei, and Yan 2007). Secondly, research (e.g. Huang. Wei, and Yan. 2007 and Kempf and Ruenzi.2008) has examined certain fund characteristics, such as fund fee, family, size, family size, and age, that can influence the sensitivity of the fund flow to fund performance. Finally, the behavior of investors and fund managers has been tested by Ferreira et al. (2012), and Keswani, Miguel, and Ramos (2016), among others, to determine whether it will influence the sensitivity of fund flow to performance.

Our paper follows previous studies by investigating whether having a foreign parent impacts the fund flow to performance relationship, as there are very few papers in this area.

To glean a better understanding of previous studies and guide my research, the literature on mutual funds' performance and the relationship between fund flow and performance is presented below. The selection of these two aspects is due firstly to the fact that few papers address the parent fund, but more focus on the fund family and the influence of the fund manager on the fund flow as this shed lights on how the mutual fund company runs its fund. Secondly, previous papers have also investigated fund performance persistence; for example, whether the funds continued performance is thanks to the fund manager's special skill to maintain it or whether it is just luck. When these topics are analyzed, Jensen's alpha is employed to measure fund performance and evaluate the fund manager's skill. We also use this in my research. Finally, the relationship of fund flow and performance can be influenced by factors such as fund size, fund family size, tax, etc. The above-mentioned factors are used as control variables in my regressions.

There is a large literature on mutual fund performance and on its determinants; including fund-level and country-level characteristics.

The paper by Chevalier and Ellison (1997) investigate the relationship between the equity funds' flow and performance given the management fee. They used the semiparametric model to test the shape of the relationship of flow-performance with Morningstar data that include 3,306 fund-years observed from 1982 to 1992. They find there is no linear relationship between them but a convex shape. They also hypothesized that fund age can influence the sensitivity of fund flow to performance. They then show that the flow-performance relationship could act as an incentive for mutual fund managers or companies to change their risk-taking in portfolios. In particular, it is a stronger incentive to change risk-taking in young funds than in older funds. Finally, they show empirically the change in

the risk of the portfolio between September and December. They also test whether managers sell the bad performance funds before doing the year-end report to create a good performance fund portfolio as a possible reason for fund managers engaging in window dressing. However, no strong evidence finds to prove this.

Droms and Walker (2001) study whether the international mutual funds can perform well over a long period. They use the labels “winner”, “loser” and “gone” to define the higher or lower average relative performance of funds over a consecutive time period; they then run a z test and a chi-square test to determine significance. The data is collected from Morningstar database which includes 529 international mutual funds from 1977 to 1996. The results show that international mutual funds have performance persistence over a 1 year period and it is statistically significant; the persistence is then lost and they find no statistical significance to support continuous performance persistence over the years.

Guedj and Papastaikoudi (2003) investigate whether the performance of funds has an impact on the fund family. Firstly, they analyze the difference between the persistence of a fund's performance in the family and in the outside world and find that it will be more persistent in the family. On further analysis, they find that this is related to the unevenly allocated resources in the family; in other words, when a fund has a better performance than others in the family, they receive more support or resources from family and can therefore maintain a higher performance persistence in the family; the difference in the superior return between top ranking and bottom ranking funds can reach 58 basis points per month and 7.2% annually. This suggests that the fund family does not allocate its resources correctly but invest more in the better performing funds. However, this has a negative effect on investors who do not put their money in top ranking funds because their funds are not

given equal support; this will influence the funds' performance and ultimately result in the family suffering money outflow.

Massimo Massa (2003) explains that the competition between funds in the mutual funds industry not only depends on the funds' performance, but also on the services provided by the families of the funds. He shows that as investors take some fees when buying or selling the funds that are in the different families, they will receive more fees if they trade their funds more frequently. However, if investors trade funds in the same family with a similar performance as other funds in the family, it will yield a lower transaction fee for investors. This will also attract more investors because an investor friendly fee policy makes the fund family more competitive. Finally, he shows that the performance of the mutual funds is negatively related to the degree of product differentiation of the category in which they are active; on the other hand, the degree of category proliferation is positively related to performance.

Research by Nanda, Wang and Zheng (2004) examine the mutual fund family's strategy. They first investigate whether some funds with a good rating in their family attract more money inflow than other funds in the same family. They find that there is more money inflow to families with star funds than those without a star. And money inflow is nearly three times more than in stand-alone star funds. They also show the return of funds is not related to the fund rating. They then address the strategy of the fund family. They analyze whether a fund family chooses to increase their fund stars to attract more money from investors; they use the portfolio to reveal that a fund family will adopt this strategy especially in bad performance families because they "find that factors that enhance the ex-ante odds of producing stars, in particular the cross-fund return standard deviation, are

associated with a significantly poorer family performance." (Nanda,Wang and Zheng 2004, page 32). Finally, on comparing the investment ability of star families and non-star families, they find no evidence to show that a star family will have an abnormal performance.

Kempf and Ruenzi (2008) investigated the relationship between fund flow and the position in the fund family. They started by investigating whether the fund's ranking in the fund family can affect their net-inflow. They find that a fund's ranking in the family will lead to a different net inflow; more specifically, if a fund has a top ranking in the family, it will receive approximately 7% more money inflow than lower ranking funds. They then show that when a fund changes from a low position to a top position in the fund family, it receives additional inflow. Finally, they demonstrate that the effect of this relationship is different in small and large families; the percentage of the fund's net inflow is affected less in small families and the gap between the flow of large and small family is around 20%. Overall, the results show that fund managers not only face the problem of how to improve their funds' performance, but also fierce competition to obtain a top ranking in the family; this suggests that the fund managers' risk-taking strategy will be influenced by the need for a good ranking in the family.

Busse, Goyal, Wahal. (2014) conduct research on the excessive return for both retail mutual funds and institutional products that invest in the global market. They first test the excessive return for retail funds by using the risk-adjusted return with a three and four factor model. After dividing the retail fund portfolio into equal-weighted and value-weighted portfolios, they find there is a positive alpha when testing with a three factor risk-adjusted return, but there is a negative alpha when using a four factor test; nevertheless,

none are statistically distinguishable from zero. They are therefore unable to find evidence for the excessive return produced by retail funds. Secondly, although they obtain a similar result when testing institutional products, the alphas in the equal-weighted funds are 0.25% per quarter higher than for the retail funds i.e. the alpha for the value-weighted institutional funds are more negative than for retail funds. They conduct a persistence test to explain the positive alpha and to find whether it is due to the fund manager's luck or to his/her ability to select securities. The result shows it is related to the fund manager's luck.

Reuter and Zitzewitz (2015) investigate the effect of the fund size on its performance. They hypothesized that the diseconomies of scale have an impact on the fund's future flow. They start by using regression discontinuity to test the diseconomies of scale in the mutual fund industry. They then use "the discrete changes in flows associated with discrete changes in Morningstar ratings to identify flows that should only impact fund returns through diseconomies of scale (Reuter and Zitzewitz 2015, page 27)". They find that the exogenous flows are wider than cross-sectional by comparing the large and small funds, but this is because the fund manager managed large funds and not because of the manger's skill. They then use the diseconomies of scale to test the effect on the risk-adjusted return but find there is no statistical significance to show the relationship between the diseconomies of scale and fund performance.

The study by Hiraki, Liu and Wang (2015) examine whether concentrated mutual funds have a better performance than diversified funds. They used data from US based international mutual funds from 1993 to 2008. This was divided into country and industry level dimensions to compare the performance of concentrated funds and diversified funds at each level. They find that concentrated funds at both levels have a better performance than

diversified funds, with 0.16% and 0.30% each month respectively (Hiraki, Liu and Wang 2015). Furthermore, they also reveal that the difference of return of small sized concentrated funds at the industry level is more significant than of large funds. Finally, they find concentrated funds performed better than diversified funds mainly at the industry level; this suggests that the fund managers were able to gather more information about the industry funds, which fostered a superior performance.

Sirri and Tufano (1998) study the flow-performance relationship of equity mutual funds and the effects of costly studies, and marketing on fund flow. They use data on 690 US open-end equity funds from the Investment Company Data Institute (ICDI) from December 1971 to December 1990. They find that the shape of the relationship between fund flow and performance is convex; this means that investors will invest more when equity mutual funds have a high performance but. Faced with the opposite situation, they fail to withdraw their money. For the relationship between the total fee paid by investors and flow, they show that investors favor funds with lower fees and less risk. They find a 2.9 per cent increase in fund flow when fees decline 100 basis points. They also find that the investor's search cost will affect the mutual fund flow. Funds with a high search fee conduct more research on marketing than their competitors, and also have a stronger performance-flow relationship. These authors also study how advertising affects fund flow, but find no clear evidence to explain this.

Van Campenhout (1998) study whether aggregate fund flow will impact the stock market, or vice versa. They start by testing determinants of the aggregate equity fund, such as the long-term interest rate, fund performance and market return. They find that a negative relationship between long-term interest rate and aggregate fund flow. However, the fund

performance and market return measured by sharp ratio has a positive effect on the aggregate flows. But this is limited to the European market as they do not obtain the same result for the American market. They then investigate whether certain information from aggregated flows can predict the market return by using Granger causality tests. However, they find no evidence to support this, which means the market return cannot be predicted by aggregate equity fund flows.

Greene and Hodges (2002) investigate the dilution impact on the actively international fund flows in the short-term. Firstly, they use daily close-to-close data over 4 years for US-based international funds to replicate the return of the S&P500 to test the reason for the dilution of the funds. They find dilution is explained by the fact that the traders use a market timing strategy; that is, they use the time difference of the close of market between US and other regions to take advantage of sale prices to generate expected annualized returns of approximately 30%. They find a -0.48% impact of dilution, which is statistically significant. This means that traders using a market timing strategy have a bad effect on the passive fund shareholder; in other words, the passive fund shareholder will transfer their part of the return (nearly $420 million in 26 months) to the active traders who understand the best time to invest. They also show whether the policies of mutual funds companies, e.g. changing the trading time from daily to monthly, could lessen the diluted impact. However, these polices may just reduce the chance of the trader making a well-timed trade, and not decrease the impact of the dilution.

Berk and Green (2004) investigate the managers' skill in the persistence of mutual funds. They develop a model which set a passive benchmark to test whether or not the manager of active open-end mutual funds have skills that lead to higher returns; it is assumed that

investors and mangers are equally informed and investors place their money according to the historical performance of the fund. They find that the manager cannot beat the benchmark. Furthermore, when investors put their money in good performance funds, they cannot predict whether or not the funds will earn the expected return and they are therefore also unable to predict the performance of the funds in the future; hence, the historical performance of the funds cannot reflect the ability of fund manager to obtain a high return. Finally, the authors conclude that investors invest in funds with a good empirical record, which is irrational.

Huang, Wei and Yan (2007) study the effect of participant costs on the flow-performance relationship of actively managed mutual funds. They develop a model to determine the different response to the mutual fund's flow-performance caused by the participant fee. They divide participant costs into the information cost, i.e. the cost of analyzing and gathering information of the target funds, and the transaction cost i.e. when investors want to buy or remediate fund shares. For the information cost, they find that the lower the information barrier for the mutual funds, i.e. with a lower participant cost, the more investors will invest in them even if they only have a moderate performance. They explain that, a lower participant cost will increase the fund inflow. However, at the high performance level, the participant cost has the reverse effect on the relationship between fund flow and performance.

Zhao (2008) study the flow of international retail equity funds. He showed some determents for international fund flow by comparing regionally diversified funds and regionally focused funds. He used the CRSP Survivor-Bias Free US Mutual Fund Database, setting quarterly data from 1992 to 2001 including 1,603 open-end international equity funds.

Firstly, he finds that investors choose international funds based on the diversification benefit. When comparing with regionally focused funds, larger regionally diversified funds have a better raw return and risk-adjusted return, and a lower risk. Secondly, he shows that funds that are less related with the US market have higher flows from investors; this is also linked to the diversification benefit. Findings show that investors tend to put their money in fund portfolios from different regions around the world. Finally, his conclusion for the relationship between flows and performance in international funds is the same for domestic funds; they are both convex-shaped for the raw return and risk-adjusted return. Buying the risk-adjusted return has a greater influence on international fund flow.

Ferreira, Keswani, Miguel, and Ramos (2012) study the relationship between fund flow and performance worldwide in open-end actively managed equity mutual funds. They use the Lipper Hindsight database in which "the sample consists of more than 16,000 open-ended and actively managed equity funds in 28 countries over 2001–2007"(Ferreira et al. 2012 page 2) to test whether there is a difference in the shape of flow-performance in these countries. They find that the shape of flow-performance of mutual funds in more developed counties is less convex; in other words, unlike America, investors tend to sell badly performing funds more and purchase funds with good performance less. They used the participant fee and investor sophistication to explain the difference. They show that investors in developed countries are able to obtain less asymmetric information and a lower transaction cost. As a result, the investor can make a more rational investment decision and is less influenced by fund companies' advertising, which means they are not blindly chasing winners or and hesitantly selling losers. The authors also show that the flow-performance relationship has an impact on the fund managers' risk taking; they take more

risk in countries with less convexity or in less developed countries because they can gain more profit when funds have a good performance and lose less when the funds do not perform very well.

Bergstresser and Poterba (2012) study the effect of the after-tax return on the flow of mutual funds. They show that investors will receive less cash inflow when they pay more tax than those who pay less tax and when the pretax return is controlled. This suggests that the investor should focus more on the after tax return than the pretax. They then test for some cross-sectional variations (such as, turnover, manager style, etc.) in the tax effect on the fund flow, and find that the manager will impose more capital gains tax liabilities on their investors by realizing accrued capital gains. They also reveal the relationship between the tax burden and gross inflow; there is a statistically significant and negative relation between tax and net inflow.

Gelos (2013) study the behavior of investors in international mutual funds and the relationship between fund flow and market transparency, and he explains the reason for contagion. Firstly, he shows there has been a significant increase in international funds especially in some emerging markets which rose to US$289 million from 1997 to 2009. He then studies investor behavior and finds it is complex and cannot be regarded as a simple characteristic. For the relationship between capital flow and market transparency, he finds evidence to confirm that the more transparent and protected a mutual fund company is, the more flow it obtains and the less asymmetric information international investors receive. Crisis contagion is explained by the mechanism of portfolio rebalancing, namely “the investors transmit idiosyncratic shocks from one market to others by rebalancing their

portfolios' exposures to common macroeconomic risks",(Kodres and Pritsker,2002, page 7) . Gelos also shows the importance of overlooking big investors' risk exposure.

Kumar, Niessen-Ruenzi and Spalt (2015) investigate whether fund flow can be influenced by the name of the fund manager using American data. They find that the annual flow of funds that have a manager with a foreign name is nearly 10 per cent lower than in funds whose manager has a native name, even when the fund's performance is the same. They also show that managers with a foreign name will suffer more penalties when their funds perform badly, and gain less when their funds perform well. They make a further analysis of the effect of the region of origin of the fund manager's name and show a greater outflow of funds when the manager's name is associated to areas of terrorist attacks, namely the Middle-East and South-Asia. They conclude there is social discrimination in the mutual funds industry in America, when investors select their mutual funds manager.

Keswani et al. (2016) examine how the culture in different countries impacts the sensitivity of flow-performance and flow-fee in their countries' mutual funds. While some studies have examined the difference in the sensitivity of countries, as opposed to analyzing distinctions caused by the development of the country and the quality of the institution, these authors are the first to use culture to determine the difference by applying Hofstede's five cultural dimensions: uncertainty avoidance, individualism, power distance, masculinity and long-term orientation as the measurement. They reveal that the culture in different countries has a positive and significant relationship on the fund manager's risk-taking, and it can help them obtain a good performance from their funds. They also find that culture increases the flow to fee sensitivity, which means fund managers will charge lower fees in order to prevent outflow from their funds.

3. Data and variables construction

3.1 Sample description

We use open-ended actively managed equity mutual funds for the period 1998 to 2010 as the mutual fund data. Data is from the Lipper Hindsight database which collects data directly from fund management companies. The database includes active and defunct funds and, therefore, it is regarded as survivorship bias free. Following Ferreira et al (2012), multiple share classes are excluded to avoid counting funds twice; even when listed as speared funds in Lipper, they have hold same fund, the same manager, and the same return before expense and loads. The initial sample includes 47,961 equity funds investing both domestically and internationally.

To confirm that the Lipper Hindsight dataset covers enough mutual fund data, the Investment Company Institution (ICI) is used to identify the difference in aggregate statistics from 46 countries with the Lipper Hindsight dataset. The results obtained are the similar to those in Keswani et al (2016); the Lipper Hindsight database reports 26,861 equity funds, while the ICI records 27,754 funds, of which the Lipper database account for 97%. For the total net asset (TNA) of equity funds in US dollars, the Lipper Hindsight database presents 88% of total net assets for the ICI recording. The TNA are $9 trillion and $10.2 trillion respectively.

Some additional restrictions are added for the final sample. Firstly, close-ended funds, indexing-tracking funds, offshore funds, exchange trade funds, and funds-of-funds are excluded, because the paper focuses mainly on open-ended actively managed equity mutual funds. Secondly, the fund size is calculated using quarterly data, and the return is calculated using monthly data. At least 24 monthly observations of fund returns are necessary to

obtain enough observations to compute the risk-adjust return, which represents the risk-adjusted fund performance. Third, the number of funds per quarter in each country is also restricted because the accuracy of the result will increase as the number of funds added to the sample increases and, hence, a minimum of 10 funds is required. Fourth, the funds observed should have data on size, family size, age, total expense ratio, and loads (front-end and back-end loads), and the origin of the fund family so as to determine the parent fund's nationality. Finally, the number of the final sample is 16,120 open-ended actively managed equity funds from 1998 to 2010. This period includes the rise in the stock market observed across countries in 2003 and 2009 and the global financial crisis 2008, and thus represents the stock market in the both bull and bear periods. In my view, the data can be used to analyze the equity mutual fund flow and performance relationship and the influence of funds with foreign parents to the sensitivity of the fund flow-performance relationship and the effect on both fund-level and country-level characteristics.

Table1 shows the number of funds and TNA (Total Net Assets) for domestic and international funds at the end of 2010. Columns two and three present the total number of funds and TNA in each country.

Table 1. Number of funds and total net asset

Panel A. Number of funds and total net asset for all sample ($M: Millions of dollars)

	All Funds		Domestic funds				International funds	
Country	Number	TNA ($M)	Number	Number (% of All)	TNA ($M)	TNA (% of All)	Number	TNA ($M)
Argentina	46	304	17	37%	156	51%	29	148
Australia	683	103,838	372	54%	51,902	50%	311	51,936
Austria	153	14,244	12	8%	1,428	10%	141	12,816
Belgium	422	24,547	14	3%	1,406	6%	408	23,141
Brazil	430	35,407	387	90%	28,073	79%	43	7,334
Canada	998	317,255	392	39%	188,174	59%	606	129,081
Denmark	193	29,637	21	11%	3,115	11%	172	26,523
Finland	167	26,824	29	17%	5,342	20%	138	21,481
France	944	187,927	198	21%	41,651	22%	746	146,275
Germany	286	118,676	46	16%	34,568	29%	240	84,109
Hong Kong	59	13,689	6	10%	1,893	14%	53	11,796
India	212	35,735	212	100%	35,735	100%		
Indonesia	40	4,332	40	100%	4,332	100%		
Italy	141	32,799	31	22%	4,510	14%	110	28,289
Japan	658	70,901	391	59%	33,451	47%	267	37,449
Malaysia	176	9,985	117	66%	7,062	71%	59	2,923
Netherlands	94	31,318	22	23%	6,035	19%	72	25,283
Norway	139	38,471	51	37%	13,234	34%	88	25,237
Poland	55	6,692	37	67%	5,736	86%	18	957
Portugal	63	2,337	18	29%	506	22%	45	1,831
Singapore	121	12,702	9	7%	1,522	12%	112	11,180
South Africa	130	22,789	111	85%	21,155	93%	19	1,635
South Korea	449	35,814	313	70%	19,979	56%	136	15,835
Spain	268	13,188	71	26%	2,447	19%	197	10,741
Sweden	251	111,707	103	41%	63,077	56%	148	48,631
Switzerland	172	28,131	53	31%	13,439	48%	119	14,693
Taiwan	228	17,189	155	68%	10,615	62%	73	6,574
Thailand	160	6,070	141	88%	5,760	95%	19	310
UK	874	427,504	365	42%	201,651	47%	509	225,854
US	1,826	3,100,104	1,388	76%	2,186,530	71%	438	913,574
Non-U.S.	8,612	1,780,014	3,734	43%	807,954	45%	4,878	972,061
All countries	10,438	4,880,118	5,122	49%	2,994,484	61%	5,316	1,885,635

The Table 1, Panel A shows that the US has the largest number of mutual funds and TNA in our sample, more specifically, 1826 funds and $3,100,104 total net assets respectively; it is followed by France and the UK. In contrast, Indonesia has the fewest mutual funds (40) and Argentina has the lowest TNA $304. We then divided the whole sample of funds into Domestic funds and International funds in line with the funds' geographic investment styles. Lipper Hindsight dataset has already classified the funds' geographic investment styles to

domestic, foreign country, regional and globe funds. However, I reduce these to two categories: domestic funds that invest in the local country, and international funds that invested in a different country or region. Table 1 shows that the more developed countries have more international funds; for example, France, Canada, and UK have 746, 606, and 509 funds respectively and this accounts for half of the funds in their country. Meanwhile, some less developed countries are more focused on the local market; for example, India and Indonesia have no international funds. On the other hand, domestic funds in the US account for 76% of all US funds. The US also has the most domestic funds, which account for 27% of domestic funds in all countries. As for TNA, the US also dominates the TNA of domestic and international funds, accounting for 76% and 48% respectively.

Table 1, Panel B is similar to table 1 Panel A but for funds with foreign parent. More specifically, we present the total number of funds with foreign parent and then domestic and international funds with foreign parents.

As we see in the second column, the UK has the largest number of funds with foreign parents accounting for 11.8% in our sample, and Canada, France and Japan also have a large number of funds with foreign parents, namely 11.1%, 9%, and 7.9% respectively. Italy has the smallest number; just 6 funds have foreign parents. The funds with foreign parents that invest in the domestic market in Brazil account for 91% of the total with foreign parents; Brazil also has the most funds with foreign parents in the whole sample (11.9%). In South Korea, 73% of funds invest in their country. India and Indonesia have the smallest number of funds investing in the international market; they also have the lowest TNA as they have no international fund. France represents 13% of the total number of

international funds with foreign parents, while South Africa accounts for just 0.12%. As for the TNA, even the US has only 5% funds with a foreign parent in the all countries sample However, it has the second biggest TNA and represents 24.5% of the total TNA. The UK accounts for 28.7% of .TNA, dominating our sample: In contrast, Portugal has the lowest TNA, representing just 0.03% of the total TNA. The TNA of domestic and international funds with foreign parents have a similar ranking in our country list. UK and US held the majority of TNA from our sample. Both can reach up to 60% per cent of the TNA of all domestic funds and 45% of international funds. Meanwhile, UK funds tend to invest in other countries, while the US funds tend to invest locally. Canada is in the third position, representing 11.7% and 11.3% respectively. The lowest TNA of domestic funds and international funds is in Argentina, which accounts for 0.021% and 0.023% of all TNA, respectively.

3.2 Construction of variables

We start by describing and constructing all the variables included in our regressions. This includes fund flow, in section 3.2.1, fund performance measures, in section3.2.2, and control variables in section 3.2.3.

3.2.1 Fund flow

Fund flow is the dependent variable in my regression; it reflects the inflow or outflow of money from investors to the fund. Following the paper by Sirri and Tufano (1998), fund flow can be calculated by getting the difference in total assets under management at the end of each quarter; a rise or fall in assets is accepted by the external injection of money except

for dividends and capital gains. In order to prevent extreme values influencing our result, we winsorize fund flows by country at the bottom and top 1% level of the distribution. Fund flow for fund i in country c at quarter t is calculated as:

$$\text{Flow}_{i,c,t} = \frac{\text{TNA}_{i,c,t} - \text{TNA}_{i,c,t-1}(1+\text{R}_{i,c,t})}{\text{TNA}_{i,c,t-1}} \quad (1)$$

$\text{TNA}_{i,c,t}$ is the total net asset value in the local currency of fund i in country c at the end of quarter t. $\text{R}_{i,c,t}$ is fund i's net raw return from country c in quarter t.

Table 2, Panel A, presents fund-level characteristics averaged across fund quarter by country, and averaged across non-US and all funds in our sample. Standard deviations are presented in parenthesis.[1] Table 2, Panel B, shows the pairwise correlation matrix between fund-level variables.

We can see from Table 2, Panel A, that Poland and Indonesia have the highest average quarterly fund flow, while South Korea and Japan have the lowest.

[1] See Appendix I for detailed description on fund-level country variables.

Panel B. Number of funds and total net asset fund with foreign parent

	All funds with foreign parent				Domestic funds with foreign parents		International funds with foreign parents	
Country	Number	Number (% of all)	TNA($M)	TNA (% of all)	Number	TNA ($M)	Number	TNA($M)
Argentina	22	48%	165	54%	5	83	17	82
Australia	219	32%	30,398	29%	109	15,475	110	14,923
Austria	57	37%	4,468	31%	5	685	52	3,783
Belgium	115	27%	4,593	19%	5	563	110	4,030
Brazil	162	38%	13,143	37%	148	12,166	14	977
Canada	312	31%	86,288	27%	117	46,124	195	40,164
Denmark	34	18%	6,650	22%	7	1,094	27	5,557
Finland	86	51%	20,228	75%	16	4,128	70	16,100
France	268	28%	48,459	26%	56	11,745	212	36,715
Germany	44	15%	5,662	5%	10	2,610	34	3,053
Hong Kong	43	73%	11,883	87%	3	1,531	40	10,352
India	59	28%	12,884	36%	59	12,884		
Indonesia	14	35%	3,523	81%	14	3,523		
Italy	6	4%	871	3%	2	183	4	688
Japan	223	34%	26,467	37%	110	9,490	113	16,976
Malaysia	21	12%	338	3%	13	181	8	158
Netherlands	30	32%	10,522	34%	7	2,004	23	8,518
Norway	35	25%	5,194	14%	21	4,439	14	755
Poland	36	65%	4,286	64%	26	3,797	10	490
Portugal	13	21%	285	12%	5	178	8	107
Singapore	77	64%	9,965	78%	7	1,357	70	8,608
South Africa	13	10%	3,875	17%	11	2,840	2	1,035
South Korea	134	30%	6,016	17%	98	3,350	36	2,666
Spain	45	17%	2,145	16%	20	599	25	1,546
Sweden	57	23%	18,223	16%	22	8,358	35	9,865
Switzerland	16	9%	906	3%	4	431	12	475
Taiwan	118	52%	10,935	64%	69	5,327	49	5,608
Thailand	58	36%	866	14%	47	661	11	205
UK	331	38%	214,542	50%	125	99,992	206	114,550
US	155	8%	183,111	6%	99	136,227	56	46,884
Non-US	2,648	31%	563,781	32%	1,141	255,797	1,507	307,984
All countries	2,803	27%	746,892	15%	1,240	392,024	1,563	354,868

Table 2. Fund-level control variables

Panel A. Fund level variables averaged across fund quarter by country

Country	Number	Raw return（%）	One-factor alpha（%）	Four-factor alpha（%）	TNA ($M)	TNA family ($M)	Flows (%)	Age (year)	Fees（%）	SMB（%）	HML（%）	Countries fund sold
Argentina	583	4.93	-0.76	-0.58	7.95	53.03	1.27	7.85	3.56	-0.24	-0.03	1.00
Australia	12,268	0.48	0.69	0.99	148.40	5,833.95	-0.39	8.53	1.89	-0.11	-0.07	1.13
Austria	4,745	1.22	-0.47	-0.37	87.93	1,498.26	0.06	9.74	2.37	0.10	-0.05	2.52
Belgium	10,142	1.10	-0.62	-0.53	72.35	13,365.59	-2.68	7.37	1.82	-0.02	-0.06	3.07
Brazil	4,506	3.65	2.38	2.41	85.07	3,890.62	0.22	7.83	2.13	0.13	-0.17	1.00
Canada	27,091	1.20	0.19	0.15	268.92	10,964.54	1.48	11.08	2.93	0.15	0.04	1.00
Denmark	5,305	2.13	0.08	0.66	119.31	1,799.91	1.47	10.56	1.91	0.00	-0.14	1.93
Finland	4,162	2.24	0.27	0.75	119.22	2,437.78	3.04	7.61	1.93	0.10	-0.03	1.57
France	36,364	0.63	-0.71	-0.68	171.85	6,037.43	0.49	11.63	2.08	0.12	-0.03	1.35
Germany	12,922	0.46	-0.95	-0.56	324.39	12,493.50	-2.15	13.41	2.07	0.02	-0.08	1.89
Hong Kong	1,375	2.50	0.86	1.54	168.17	3,331.07	1.15	15.09	2.43	0.09	-0.15	3.24
India	4,080	7.35	2.30	2.07	110.17	1,503.85	0.77	7.50	1.44	-0.42	0.36	1.45
Indonesia	536	7.21	1.86	1.13	82.63	196.42	6.70	8.10	2.21	-0.20	0.10	1.05
Italy	10,171	-0.08	-0.96	-0.31	275.11	4,657.63	-2.12	9.52	2.47	-0.06	-0.11	1.01
Japan	21,286	1.17	-0.72	-0.88	79.09	7,936.49	-4.03	8.65	1.93	0.10	0.00	1.00
Malaysia	3,621	2.76	0.85	-0.39	42.55	709.03	-2.14	10.64	2.52	0.01	0.50	1.09
Netherlands	3,898	1.07	-0.76	-0.16	286.75	3,049.66	-0.46	12.13	1.39	0.01	-0.12	1.26
Norway	4,685	2.69	0.80	0.86	142.68	2,051.46	0.89	10.00	1.99	0.17	0.01	1.56
Poland	946	2.27	-0.73	-1.02	137.67	425.90	7.78	6.93	4.11	-0.54	0.00	1.00
Portugal	1,751	0.79	-0.65	-0.45	51.81	378.81	-0.20	9.38	2.22	0.15	-0.13	1.09
Singapore	4,266	2.17	0.31	0.84	47.03	740.69	-0.74	9.05	2.64	0.05	-0.10	1.25
South Africa	1,846	3.53	1.10	1.23	136.78	1,339.14	1.19	9.13	1.89	-0.35	-0.11	1.00
South Korea	8,032	4.58	-1.26	0.20	54.28	2,258.38	-10.66	5.64	1.63	0.16	-0.53	1.00
Spain	10,019	0.85	-1.01	-0.72	64.97	1,511.93	-0.27	8.71	2.19	-0.15	-0.03	1.02
Sweden	8,400	1.97	0.25	1.71	313.22	10,617.85	1.30	12.10	1.53	-0.06	-0.22	1.42
Switzerland	5,649	1.12	-0.14	-0.20	190.29	7,929.00	-1.11	14.70	2.22	0.05	-0.02	1.47
Taiwan	6,019	2.83	-1.11	-0.71	56.43	738.65	-1.15	9.15	3.12	0.27	0.01	1.01
Thailand	3,197	5.25	1.96	0.82	17.93	279.50	-2.29	8.28	1.57	-0.27	0.22	1.00
UK	30,277	1.59	-0.16	-0.17	397.19	8,558.14	0.41	15.70	2.13	0.22	-0.04	2.01
US	90,626	1.73	-0.01	0.23	1,465.32	60,623.41	0.71	13.68	1.77	0.06	-0.06	1.05
Non-U.S.	248,142	2.40	0.10	0.26	140.01	4,020.28	-0.08	9.86	2.22	-0.02	-0.03	1.43
		(1.91)	(1.06)	(0.95)	(101.47)	(4,030.68)	(3.20)	(2.51)	(0.61)	(0.20)	(0.18)	(0.61)
All Countries	338,768	2.38	0.10	0.26	184.18	5,907.05	-0.05	9.99	2.20	-0.01	-0.03	1.41
		(1.88)	(1.04)	(0.93)	(261.70)	(11,067.22)	(3.15)	(2.57)	(0.60)	(0.19)	(0.17)	(0.61)

Panel B. Pairwise correlation of fund-level variables

	1	2	3	4	5	6	7	8	9	10	11
Raw return	1										
One-factor alpha	0.44	1									
Four-factor alpha	0.35	0.81	1								
TNA	0.03	0.04	0.04	1							
TNA family	0.01	0.02	0.02	0.55	1						
Flows	0.07	0.07	0.05	0.10	0.02	1					
Age	-0.01	0.01	-0.01	0.37	0.20	-0.03	1				
Fee	-0.01	-0.01	-0.01	-0.14	-0.10	0.01	-0.04	1			
SMB	-0.01	0.03	-0.01	-0.01	-0.03	0.01	0.00	0.07	1		
HML	0.02	0.01	-0.16	0.01	-0.02	0.02	0.05	0.02	0.00	1	
Countries funds sold	0.01	0.01	0.01	0.11	0.09	0.02	0.07	0.03	-0.01	-0.01	1

3.2.2 Performance measurement

Following Ferreira et al. (2012), fund performance is measured using raw returns and risk-adjusted returns. Raw returns are gross of taxes and net of total expense. The risk-adjusted returns are computed by Jensen's alpha and four-factor alpha model (Carhart 1997). Jensen's alpha is the value that evaluates whether the fund manager can realize the abnormal return or not, and is given by:

$$\partial_{\mathrm{j}} = \mathrm{R_{it}} - \left[\mathrm{R_{ft}} + \beta_{\mathrm{itM}} * (\mathrm{R_{Mt}} - \mathrm{R_f})\right] \qquad (2)$$

Where alpha j is the difference between the realized return and the return with predict return measured by estimated Beta. R_{it} is the realized returns of fund i in time t and t-1. The R_{ft} is the return of the risk free rate in time t, which is computed by using average interbank rates for each country. For the US, we use the US T-bill rate from the Federal Reserve. R_{mt} is the excess return for each country or region's market.

There are two different ways of computing the Jensen alpha for domestic and international funds: for domestic funds, we regress the previous 36 months of funds' excess return per quarter in their domestic market. The Jensen's alpha is obtained by

comparing this with the realized return in the same quarter. The Jensen alpha is calculated in the same way for international funds in the region market where the fund invests in, as defined by Lipper geographic focus field. Similar to Following Ferreira et al. (2012), we divide the geographic focus into four regions (Europe, Asia–Pacific, North America, Emerging Markets). We proceed similarly for global funds, i.e., funds investing all over the world, for which we use a global market factor.

Calculating the four factor alpha is the same as for Jensen's alpha for domestic and international funds. It adds factors of size, value, and momentum to the regression, given by:

$$R_{it} = \partial_j + \beta_{0i} RM_t + \beta_1 SMB_t + \beta_2 HML_t + \beta_3 MOM_t + \epsilon_{1t} \quad (3)$$

where alpha J and RM_t have the same meaning as in the equation of Jensen's alpha; SMB_t is the average return on three small portfolios minus the average return on three large portfolios; HML_t is the average return on two value portfolios minus the average return on two growth portfolios; MOM_t is the return of portfolio with the past 12-month winner minus the return of the portfolio with the past 12-month loser (Ferreira et al. 2012).

Fund performance measures are including in Table 2, Panel A. India, Indonesia, Thailand have the highest average raw return, namely 7.5%, 7.21% and 5.25%, while Italy has the lowest raw return -0.08%. As for risk-adjusted performance, Brazil is the country with highest one-factor alpha 2.38% followed India and Taiwan with 2.30%, 1.96% respectively. However Italy also has the lowest raw return -0.95%. As for the four-factor alpha to measure the return, we can see the Brazil dominate the highest return which is 2.41 percent, while the Poland has lowest return is -1.02%.

3.2.3 Additional mutual fund characteristic

According to past academic research, there are some additional fund characteristics that can determinate the flow-performance relationship. These are regarded as control variables. Fund size is measured by using total net asset, and it will affect fund flow, see, i.e., Chevalier and Ellison (1997), Sirri and Tufano (1998), Brennan and Hughes (1991), and Jonathan and Zitzewitz (2015). The size of the fund family, measured by the total net assets of the fund family, also impacts fund performance; a large family benefits from being able to obtain information and having more experience to create a new fund with low cost, so they can earn more money inflow from their investors (Chen, Hong, Huang and Kubik, 2004, and Khorana and Servaes, 1999). Ferreira et al. (2012) find that there is a negative relationship between fund age and in non-US countries; it is therefore also added to my regression. It is sometimes argued that fund fee influences fund flow. Whereas Chen et al. (2004) find that fees do not affect fund flow, Huang et al (2007), Sirri and Tufano (1998) find that fees have a negative impact on fund flow.

We also include a dummy variable that is equal to one if the fund is foreign and zero otherwise, primarily to control for the fact that investors may direct their money more or less to a fund depending on whether it invests primarily in domestic or foreign markets. The number of countries where the fund is sold might also impact the flow as stated by Ferreira et al. (2012). Finally, the style of the fund also influences the fund flow, and is measured by the loadings on SMB and HML (see, i.e., Ferreira et al., 2012, and Keswani, et al, 2016).

Table 2 Panel A shows the different countries' fund-level control variables. The fund size in the US is larger than in other countries, reaching 1,465.32 million dollars, followed by the UK, German, and Sweden with 397.19, 324.38, and 313.22 million dollars respectively. They also have a large family size; although Belgium does not have

a large fund size, but has the second largest family size in the sample. As can be seen in the table, more developed countries, such as the UK, US, Japan, France, and Netherlands, have older funds and lower fees. In countries like Argentina, Poland, and Malaysia mutual funds charge higher fees. As for the funds' nationality, Austria and Belgium have more international funds, while the US and Brazil is the countries with more domestic funds.

Table 2 Panel B, shows the pairwise correlation matrix between fund-level variables. From the table we can see that the variables are not strongly correlated with each other meaning that that these control variables can be included together in the flow-performance regressions.

4. Methodology

We start by using a linear approach in order to test the flow-performance relationship. In each country-quarter fund performance is ranked using last year fund performance. Fund performance is measured using raw-returns and one and four-factor alphas. We then regress fund flows on past performance rank together with the control variables presented in Section 3. Because the US is by far the country with the highest number of funds and TNA, we compute the flow-performance relationship for all countries in our sample, for non-US countries, and for the US just by itself.

Equation 4, below represents the linear regression in which we regress flows on fund past performance rank:

$$\text{Flow}_{i,c,t} = a + b_{i,c} * \text{performance rank}_{i,c,t-1} + c_{i,c} * \text{dummy foreign parent}_{i,c,t-1} + d_{i,c} * \text{control variables}_{i,c,t-1} + \varepsilon_{2,t} \quad (4)$$

Where *i is t*he fund, *c* is the fund's responding country, while *t* is the time period. All regressions include time and country fixed effects and p-values are heteroskedasticity-robust and clustered by country. To test how having a foreign parent impacts on the level of flows, we also include the dummy variable foreign parent. Finally, because our main goal is to test whether the nationality of the fund parent influences how investors react to past performance, i.e., influence the flow-performance sensitivity, we add to equation 5 the interaction between past performance rank and the dummy variable foreign parent.

$$\begin{aligned} Flow_{i,c,t} = a + b_{i,c} * \text{performance rank}_{i,c,t-1} + c_{i,c} * \text{dummy foreign parent}_{i,c,t-1} + \\ d_{i,c} * \text{perforamcee rank}_{i,c,t-1} * \text{dummy foreign parent}_{i,c,t-1} + \\ e_{i,c} * \text{control variables}_{i,c,t-1} + \varepsilon_{2,t} \end{aligned} \quad (5)$$

Following Keswani et al. (2016), prior year's performance rank is measured using raw returns, one-factor alpha, and four-factor alpha. We therefore rerun each of the three previous equations (3, 4, and 5) for the three performance measures

Because the literature has shown flow-performance sensitivity to be no linear, we also rerun the same regressions using a two-piecewise linear, and three-piecewise linear aproach. The goal is to test the impact of the flow-performance sensitivity at different levels of performance (Chevalier and Ellison, 1997; Sirri and Tufano, 1998 and Ferreira, et al. 2012)

For the two-piecewise linear approach, we start by dividing the performance into the lowest quintile (low) and the top quintile (high) by ranking the return of the funds from the past year ranging from zero (lowest performance) to one (top performance) for each quarter and in each country. The rank is assigned to the funds based on the past year's

performance (Ferreira et al. 2012). The slopes are first estimated separately using a two-piecewise specification for the bottom half (Low), and the top half (High), we rerun equations 4 and 5 in which we replace performance with the bottom half (Low), and the top half (High):

$$\text{Flow}_{i,c,t}=a+b_{i,c}*\text{performance rank}_{i,c,t-1}+c_{i,c}*\text{dummy foreign parent}_{i,c,t-1}+ d_{i,c}*\text{control variabl}_{i,c,t-1}+ \varepsilon_{2,t} \quad (6)$$

By interacting past performance with the foreign parent dummy:

$$\text{Flow}_{i,c,t}=a+b_{i,c}*\text{performance rank}_{i,c,t-1}+c_{i,c}*\text{dummy foreign parent}_{i,c,t-1}+ d_{I,c}*\text{perforamcee rank}_{I,c,t-1}*\text{dummy foreign parent}_{I,c,t-1}+ e_{i,c}*\text{control variables}_{i,c,t-1}+ \varepsilon_{2,t} \quad (7)$$

Finally, we proceed likewise for the three-piecewise approach. The only difference is that we also add the middle part to the third quintiles to rank the performance of the fund, using the same method as before; different slopes are computed for different quintiles. We now have the bottom quintile (LOW), middle quintile (MID) and top quintile (HIGH):

$$\text{Flow}_{i,c,t}=a+b_{i,c}*\text{performance rank}_{i,c,t-1}+c_{i,c}*\text{dummy foreign parent}_{i,c,t-1}+ d_{i,c}*\text{control variables}_{i,c,t-1}+ \varepsilon_{2,t} \quad (8)$$

We test the impact of the foreign parent on the flow-performance sensitivity by interacting past performance with the foreign parent dummy:

$$Flow_{i,c,t}=a+b_{i,c}*\text{performance rank}_{i,c,t-1}+c_{i,c}*\text{dummy foreign parent}_{i,c,t-1}+$$
$$d_{i,c}*\text{perforamcee rank}_{i,c,t-1}*\text{dummy foreign parent}_{i,c,t-1}+$$
$$e_{i,c}*\text{control variables}_{i,c,t-1}+\varepsilon_{2,t} \quad (9)$$

After running equation (6) to equation (9) and we also run a Wald test in which we test the shape of the flow-performance relationship, namely we test for convexity by examining whether the difference in the slopes between the low and high part of the regression function is statistically significant (see, i.e., Ferreira et al, 2012).

The empirical results of running the regressions presented in this Section are presented in Section 5.

5. Empirical results

In this section we present the result that we showed from Table 3 Panel A to Panel C. In section 5.1, we start by to explain the foreign parents' effects on fund flow-performance sensitivity. Section 5.2 presents the results when we include country level variables and analyze whether investor sophistication explain differences in the flow-performance sensitivity to funds with foreign parents.

5.1 The impact of having a foreign parent on the flow-performance sensitivity

In this section, we present the results of all the regressions presented in section 5. Table 3, Panels A, B, and C, present the results using the linear, the two-piecewise and the three-piecewise approaches, respectively. As mentioned in the previous section, fund and the three-piecewise approaches, respectively. As mentioned in the previous section, fund performance is measured by 3 different ways, we will shows the regression result

when use raw return and one factor alpha to measure performance in the Table 3 Panel A to Panel C. The way of four factor alpha, we will shows in the Appendix III Table 8 Panel A to Panel C.

Table 3 Panel A, shows the first regression testing for the flow-performance relationship using a linear approach. Across different specifications and samples, and whatever performance measure we use, we find that fund performance rank is positively related with flows, suggesting that investors will put more money into better performing funds, and vice versa. The foreign parent dummy is only statistically significant for the US (columns 5 and 11), where funds with a foreign parent get significantly less flows. Outside the US (columns (3 and 9)) having a foreign parent has no statistically significant impact in the level of flows on how investors invest their money. The same happens when we run the regressions including all countries in our sample.

We run the regression in equation (5) where we interact fund performance rank with the foreign parent dummy. The results are presented in even columns and show that in non-US countries mutual fund investors react more to past performance when mutual funds have a foreign parent. The results are particularly strong when performance measure is measured using one and four factors alpha. For US funds, the interaction of fund performance rank with the foreign parent dummy is never statically significant.

As for other explanatory variables for the fund-flow relationship, most are in line with previous research. The coefficient of the fund nationality has a positive impact on the fund flow and is only significant for the US, consistent with the results of Dorm and Walker (2001). As in Ferreira et al. (2012), fund size is positively related to flows outside the US and negatively related in the US. Fund family size is positively correlated with fund flow and the data is not significant for the Non-US area. As in Ferreira et al. (2012) for the natural log of fund age, all coefficients are negative,

indicating that a young fund will attract more money inflow from investors, and they are statistically significant. Our results are consistent with previous studies in relation to the fund fee, which has a negative relationship with fund-flow (Sirri and Tufano, 1998 and Huang, Wei and Yan. 2007). Finally, the number of countries in which the fund is sold has a positive effect on fund flow and is statistically significant. This means that the higher the number of countries in which the fund is sold, the more money it will attract.

Table 3 Panel B, presents the results using the two-piecewise linear approach. Performance is ranked for the bottom fifty and top fifty rank performers, according to equation (6 and 7) Table 3, Panel B, presents the results using the two-piecewise linear approach.

The results in columns (1, 3, and 7) are in line with previous studies showing that fund performance and flow do not have a linear relationship (Chevalier and Ellison,1995, Gruber ,1996, and Sirri and Tufano,1998). If there was a linear relationship, funds would have the same sensitivity to fund performance across the performance rank; in other words, whether the performance of the fund is good or bad, investors would buy or sell the fund with the same intensity. However, the results in all columns show that fund flow reacts differently when the fund performance is different. This is the case when using any of the three performance measures included in our study. When we compare the coefficient of low and high performance funds, the coefficient of the low performance fund is always lower than the high performance fund, regardless of the region or method of measuring the fund return, and both are statistically and economically significant. This suggests that investors pursue more funds with a good historical performance, and sell less funds that perform poorly. The results of running the Wald test confirm that the differences on low and high performance coefficients are statistically significant. This is consistent the convex flow-performance relationship

documented in different studies, including Sirri and Tufano (1998) and Ferreira et al. (2012).

When we analyze the effect of a foreign parent on the convexity of the flow-performance relationship, focusing primarily on the differences between non-US countries and the US, the results show that, outside the US, having a foreign parent increases the sensitivity to past performance.

Table 3 Panel C, presents the results using the three-piecewise linear approach. For the three-piece linear regression analysis, the mid quartile is added and this provides more detailed information to see the investor' reaction to the fund' past performance. We therefore rank performance for the bottom twenty, middle sixty and top twenty percentiles of the performance rank (see equation 8 and 9)

We start by documenting the convexity of the flow-performance relationship as in Sirri and Tufano (1998) and Ferreira et al. (2012). Similarly to our previous results using a two-piece linear regression, all Columns show that investors buy winners with a much higher intensity that they sell losers.

The results show that, when we pool all countries in our sample, in columns (2), (8), and (12) the impact of having a foreign parent is not statically significant. Our results also show, in columns (4), and (10) , that, outside the US, having a foreign parent influence the relationship between fund flow and performance. More particularly, we can see that, in non-US countries, funds with a foreign parent increase the level of convexity in the flow-performance relationship. This either because investors tend to buy more winners, when performance is measured using raw returns, or because investors sell poor performers with less intensity, in the case when performance is measured using one-factor alpha. For four factor alpha to measure fund performance shows in the appendix III Table 8 Panel C the results are not statistically significant, indicating that for the

most sophisticated investors outside the US, having a foreign parent is not relevant when directing their investments to the mutual fund industry.

That is also what happens in the US, but when performance is measured using raw returns, in column (6), the results are the opposite, i.e, funds with a foreign parent present less convex flow-performance sensitivity. This is because investors seem to sell more bottom performance funds that have a foreign parent.

Overall, our results indicate that having a foreign parent has a significant impact on the flow-performance sensitivity, particularly outside the US, where funds with a foreign parent show evidence of having lower convexity. The results are consistent with our main hypothesis that, when making their investment decisions, less sophisticated investors are expected to be more influenced by the circumstance that a fund has a foreign parent. The results also confirm that this influence leads investors to reduce the convexity of their flow-performance relationship.

Table 3. The relationship of fund flow to performance across all countries, non-US, and US

Panel A. Measurement of flow-performance relationship using a linear approach

	Raw returns						One-factor alpha					
	All		Non-US		US		All		Non-US		US	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Performance	6.5683***	6.7851***	5.4306***	5.3792***	8.3646***	8.3442***	6.2025***	6.3293***	4.9092***	4.6787***	8.3898***	8.3980***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Performance rank x foreign parent		-0.8691**		0.1691		0.1944		-0.5064		0.7588**		-0.0768
		(0.01)		(0.61)		(0.78)		(0.13)		(0.02)		(0.92)
Foreign parent	-0.1200	0.3184	-0.0373	-0.1227	-0.6671***	-0.7645**	-0.0759	0.1776	-0.0024	-0.3833*	-0.6005***	-0.5626
	(0.33)	(0.12)	(0.79)	(0.56)	(0.00)	(0.02)	(0.53)	(0.40)	(0.99)	(0.09)	(0.00)	(0.11)
Foreign fund	0.3524**	0.3453**	0.1591	0.1593	2.3163**	2.3250**	0.3012**	0.2985**	0.1451	0.1456	2.2504**	2.2467**
	(0.02)	(0.02)	(0.32)	(0.32)	(0.02)	(0.02)	(0.04)	(0.04)	(0.36)	(0.35)	(0.02)	(0.02)
Log Size	-0.5712***	-0.5712***	-0.5324***	-0.5325***	-0.6373***	-0.6373***	-0.5673***	-0.5673***	-0.5228***	-0.5230***	-0.6478***	-0.6479***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log Family Size	0.1544***	0.1536***	0.0723*	0.0723*	0.2463***	0.2465***	0.1534***	0.1531***	0.0694*	0.0693*	0.2519***	0.2519***
	(0.00)	(0.00)	(0.07)	(0.07)	(0.00)	(0.00)	(0.00)	(0.00)	(0.08)	(0.08)	(0.00)	(0.00)
Log Age	-0.7654***	-0.7652***	-0.6236***	-0.6236***	-0.8002***	-0.8003***	-0.7707***	-0.7702***	-0.6218***	-0.6226***	-0.8118***	-0.8118***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Fee	-0.0658*	-0.0654*	-0.0131	-0.0131	-0.1115***	-0.1116***	-0.0680*	-0.0678*	-0.0122	-0.0123	-0.1199***	-0.1199***
	(0.06)	(0.07)	(0.80)	(0.80)	(0.00)	(0.00)	(0.06)	(0.06)	(0.82)	(0.81)	(0.00)	(0.00)
Flows	0.1555***	0.1554***	0.1209***	0.1209***	0.2804***	0.2804***	0.1574***	0.1574***	0.1228***	0.1227***	0.2804***	0.2804***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
SMB	-0.1367	-0.1358	-0.1576	-0.1578	-0.3490	-0.3494	-0.3773*	-0.3772*	-0.3275	-0.3258	-0.6622***	-0.6620***
	(0.54)	(0.54)	(0.52)	(0.51)	(0.13)	(0.13)	(0.09)	(0.09)	(0.18)	(0.18)	(0.00)	(0.00)
HML	0.1730	0.1727	0.0246	0.0246	0.2837*	0.2835*	0.3772**	0.3759**	0.2289	0.2296	0.3630**	0.3630**
	(0.34)	(0.34)	(0.89)	(0.89)	(0.05)	(0.05)	(0.04)	(0.04)	(0.21)	(0.21)	(0.01)	(0.01)
Countries fund sold	0.3368***	0.3370***	0.3485***	0.3486***	0.9214***	0.9218***	0.3517***	0.3527***	0.3607***	0.3596***	0.8518***	0.8516***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.069	0.069	0.054	0.054	0.151	0.151	0.068	0.068	0.053	0.053	0.152	0.152
Number of observations	338768	338768	248142	248142	90626	90626	338768	338768	248142	248142	90626	90626

, **, and * indicate significance at the 10%, 5%, and 1% level, respectively.*

Panel B. Measurement of flow-performance relationship using two-piecewise approach

	Raw returns						One-factor alpha					
	All		Non-US		US		All		Non-US		US	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Low t-1	4.2481***	4.5809***	3.4687***	3.7579***	5.6578***	5.6454***	4.2663***	4.5909***	3.3358***	3.5087***	5.8331***	5.9296***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Low x foreign parent		-1.3630**		-0.9713		0.1126		-1.3028**		-0.5861		-0.9040
		(0.01)		(0.11)		(0.92)		(0.03)		(0.38)		(0.47)
High t-1	8.8780***	8.9868***	7.3682***	6.9851***	11.1555***	11.1238***	8.1404***	8.0707***	6.4734***	5.8450***	11.0000***	10.9125***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
High x foreign parent		-0.4140		1.2657*		0.3095		0.2881		2.0909***		0.8376
		(0.55)		(0.07)		(0.84)		(0.69)		(0.00)		(0.58)
Foreign parent	-0.1307	0.4350**	-0.0477	0.1548	-0.6715***	-0.7527**	-0.0819	0.3696*	-0.0071	-0.0524	-0.6093***	-0.3767
	(0.28)	(0.05)	(0.73)	(0.51)	(0.00)	(0.04)	(0.50)	(0.10)	(0.96)	(0.83)	(0.00)	(0.39)
Foreign fund	0.2586*	0.2500*	0.0930	0.0908	2.2270**	2.2360**	0.2695*	0.2651*	0.1167	0.1142	2.0853**	2.0777**
	(0.08)	(0.09)	(0.56)	(0.57)	(0.02)	(0.02)	(0.07)	(0.07)	(0.46)	(0.47)	(0.03)	(0.04)
Log Size	-0.5608***	-0.5609***	-0.5245***	-0.5245***	-0.6218***	-0.6218***	-0.5589***	-0.5592***	-0.5171***	-0.5174***	-0.6331***	-0.6335***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log Family Size	0.1538***	0.1529***	0.0708*	0.0703*	0.2464***	0.2466***	0.1531***	0.1526***	0.0697*	0.0690*	0.2490***	0.2489***
	(0.00)	(0.00)	(0.07)	(0.08)	(0.00)	(0.00)	(0.00)	(0.00)	(0.08)	(0.08)	(0.00)	(0.00)
Log Age	-0.7571***	-0.7565***	-0.6137***	-0.6134***	-0.8027***	-0.8026***	-0.7607***	-0.7600***	-0.6130***	-0.6137***	-0.8085***	-0.8073***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Fee	-0.0663*	-0.0660*	-0.0156	-0.0157	-0.1069***	-0.1070***	-0.0693*	-0.0693*	-0.0147	-0.0149	-0.1178***	-0.1180***
	(0.06)	(0.06)	(0.77)	(0.76)	(0.00)	(0.00)	(0.05)	(0.05)	(0.78)	(0.78)	(0.00)	(0.00)
Flows	0.1547***	0.1547***	0.1204***	0.1204***	0.2783***	0.2783***	0.1568***	0.1568***	0.1225***	0.1224***	0.2789***	0.2789***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
SMB	-0.2681	-0.2679	-0.2642	-0.2646	-0.5321**	-0.5326**	-0.4945**	-0.4954**	-0.4184*	-0.4184*	-0.8798***	-0.8786***
	(0.23)	(0.23)	(0.28)	(0.28)	(0.02)	(0.02)	(0.03)	(0.03)	(0.09)	(0.09)	(0.00)	(0.00)
HML	0.1788	0.1783	0.0248	0.0237	0.3165**	0.3163**	0.3823**	0.3812**	0.2295	0.2302	0.3858***	0.3866***
	(0.33)	(0.33)	(0.89)	(0.90)	(0.03)	(0.03)	(0.03)	(0.03)	(0.21)	(0.20)	(0.01)	(0.01)
Countries fund sold	0.3316***	0.3319***	0.3443***	0.3445***	0.9216***	0.9223***	0.3455***	0.3465***	0.3557***	0.3548***	0.8465***	0.8484***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.070	0.070	0.054	0.054	0.152	0.152	0.069	0.069	0.053	0.053	0.152	0.152
Number of observations	338768	338768	248142	248142	90626	90626	338768	338768	248142	248142	90626	90626
Wald test βHigh=βLow (p-value)	0.0000		0.0000		0.0000		0.0000		0.0000		0.0000	

,, and *** indicate significance at the 10%, 5%, and 1% level, respectively.*

Panel C. Measurement of flow-performance relationship using three-piecewise approach

	Raw returns						One-factor alpha					
	All		Non-US		US		All		Non-US		US	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Low t-1	6.0960***	5.7766***	6.4037***	6.3197***	5.0864***	4.2590***	7.2563***	7.9252***	7.6638***	8.7349***	5.4041***	5.2911***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Low x foreign parent		1.3065		0.2549		8.1527**		-2.6497		-3.5687*		1.0905
		(0.47)		(0.90)		(0.01)		(0.14)		(0.07)		(0.77)
Mid t-1	5.1208***	5.5446***	3.8149***	3.9801***	7.5408***	7.7200***	4.5406***	4.5886***	2.9911***	2.5902***	7.5358***	7.6072***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Mid x foreign parent		-1.7127***		-0.5416		-1.7247*		-0.1954		1.3353***		-0.6822
		(0.00)		(0.29)		(0.07)		(0.67)		(0.01)		(0.49)
High t-1	18.2046***	17.4423***	16.7865***	15.1985***	18.5547***	17.8129***	17.7991***	18.0366***	16.5981***	16.4335***	18.2887***	17.9280***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
High * foreign parent		3.0629		5.1305**		7.0863		-0.9119		0.5253		3.4408
		(0.17)		(0.03)		(0.19)		(0.67)		(0.82)		(0.53)
Foreign parent	-0.1256	0.0944	-0.0429	-0.0326	-0.6680***	-1.7599***	-0.0804	0.4737	-0.0050	0.2244	-0.6115***	-0.6746
	(0.30)	(0.76)	(0.76)	(0.92)	(0.00)	(0.00)	(0.51)	(0.12)	(0.97)	(0.50)	(0.00)	(0.30)
Foreign fund	0.2287	0.2203	0.0503	0.0489	2.2193**	2.2266**	0.2029	0.1996	0.0324	0.0311	2.0300**	2.0319**
	(0.12)	(0.13)	(0.75)	(0.76)	(0.02)	(0.02)	(0.17)	(0.17)	(0.84)	(0.84)	(0.03)	(0.03)
Log Size	-0.5651***	-0.5651***	-0.5293***	-0.5289***	-0.6250***	-0.6254***	-0.5624***	-0.5627***	-0.5220***	-0.5226***	-0.6331***	-0.6335***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log Family Size	0.1543***	0.1535***	0.0712*	0.0707*	0.2473***	0.2480***	0.1543***	0.1539***	0.0711*	0.0705*	0.2498***	0.2500***
	(0.00)	(0.00)	(0.07)	(0.07)	(0.00)	(0.00)	(0.00)	(0.00)	(0.08)	(0.08)	(0.00)	(0.00)
Log Age	-0.7523***	-0.7519***	-0.6103***	-0.6098***	-0.7999***	-0.8013***	-0.7666***	-0.7658***	-0.6223***	-0.6229***	-0.8144***	-0.8139***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Fee	-0.0662*	-0.0658*	-0.0147	-0.0149	-0.1072***	-0.1073***	-0.0685*	-0.0685*	-0.0125	-0.0125	-0.1172***	-0.1172***
	(0.06)	(0.06)	(0.78)	(0.78)	(0.00)	(0.00)	(0.05)	(0.05)	(0.81)	(0.81)	(0.00)	(0.00)
Flows	0.1538***	0.1537***	0.1196***	0.1196***	0.2770***	0.2770***	0.1560***	0.1559***	0.1217***	0.1217***	0.2777***	0.2777***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
SMB	-0.2965	-0.2967	-0.3005	-0.3016	-0.5383**	-0.5406**	-0.5338**	-0.5347**	-0.4654*	-0.4662*	-0.8950***	-0.8952***
	(0.19)	(0.19)	(0.22)	(0.22)	(0.02)	(0.02)	(0.02)	(0.02)	(0.06)	(0.06)	(0.00)	(0.00)
HML	0.1819	0.1811	0.0220	0.0206	0.3223**	0.3243**	0.3812**	0.3801**	0.2182	0.2190	0.3939***	0.3948***
	(0.32)	(0.32)	(0.90)	(0.91)	(0.03)	(0.03)	(0.03)	(0.03)	(0.23)	(0.23)	(0.01)	(0.01)
Countries fund sold	0.3306***	0.3309***	0.3432***	0.3435***	0.9160***	0.9170***	0.3439***	0.3449***	0.3541***	0.3531***	0.8478***	0.8491***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.070	0.070	0.055	0.055	0.152	0.152	0.069	0.069	0.054	0.054	0.152	0.152
Number of observations	338768	338768	248142	248142	90626	90626	338768	338768	248142	248142	90626	90626
Wald test βHigh=βLow (p-value)	0.0000		0.0000		0.0000		0.0000		0.0000		0.0000	

,, and *** indicate significance at the 10%, 5%, and 1% level, respectively.*

5.2 Foreign parent, flow-performance sensitivity and investor sophistication

In the previous Section, we analyze the impact of having a foreign parent on the flow-performance sensitivity across countries, more particularly, when pooling all the countries in our sample, outside the US and for the US. We show that the flow-performance sensitivity of funds with a foreign parent is different for non-US and US investors. The results are consistent with less sophisticated investors, i.e., investors investing in less developed markets (non-US) being more influence by the nationality of the fund parent. The results also show a more convex flow-performance relationship for these investors.

Ferreira et al. (2012) has already demonstrated that investors in countries with less economic, mutual fund industry and financial development tend to buy more winners and sell less funds at the bottom of the performance rank. Their results show therefore that less sophisticated investors having a higher convexity in their flow-performance relationship.

Our hypothesis is that less sophisticated investors are also expected to be more influenced by whether the fund has or not a foreign parent. To test this hypothesis, in this section we rerun the regressions presented in Section 5.1 (equation 9) for more and less sophisticated countries in our sample. We proxy for investors sophistication using country variables that measure the level of economic development, mutual fund industry development, financial development in the country as in Ferreira et al (2012).

Economic development is measured using GDPC per capita as proxy variable and financial development variables include financial literacy, financial sophisticated, and emerging market. The mutual fund industry development is measured using the mutual fund industry market cap and mutual fund numbers.

In Table 4, we start by showing the country level variables averaged across time by country for the period 2001-2010.

Table 4. Country level variables among all sample countries.

	Economic development	Financial development			Mutual fund industry development	
Country	GDP per capita	Financial literacy %	Financial sophistication	Emerging market	Market cap $M	Number of funds
Argentina	7,845	28%	3.91	1.00	0.02	60
Australia	42,006.33	64%	6.25	0.00	0.38	3,978
Austria	39,957.98	53%	5.26	0.00	0.25	424
Belgium	38,828.56	55%	5.67	0.00	0.27	610
Brazil	9,011.56	35%	5.40	1.00	0.05	855
Canada	39,731.28	68%	6.20	0.00	0.14	2,105
Denmark	51,403.08	71%	5.84	0.00	0.17	235
Finland	41,373.59	63%	5.93	0.00	0.13	212
France	33,909.85	52%	5.73	0.00	0.24	1,704
Germany	34,854.41	66%	5.94	0.00	0.11	547
Hong Kong	28,049.70	43%	6.40	0.00	0.44	88
India	1,032.31	24%	4.90	1.00	0.02	284
Indonesia	2,129.89	32%	3.48	1.00	0.02	51
Italy	29,351.55	37%	4.43	0.00	0.14	381
Japan	36,057.72	43%	5.03	0.00	0.10	1,249
Malaysia	6,481.91	36%	5.10	1.00	0.04	236
Netherlands	41,400.25	66%	6.07	0.00	0.08	185
Norway	69,887.84	71%	5.44	0.00	0.13	188
Poland	9,927.26	42%	3.97	1.00	0.05	97
Portugal	19,673.79	26%	5.25	0.00	0.03	66
Singapore	32,432.34	59%	5.94	0.00	0.06	288
South Africa	6,109.42	42%	5.94	1.00	0.03	209
South Korea	17,716.78	33%	4.64	1.00	0.08	707
Spain	27,439.04	49%	5.37	0.00	0.09	503
Sweden	42,451.17	71%	6.06	0.00	0.23	319
Switzerland	53,556.21	57%	6.59	0.00	0.06	306
Taiwan	16,485.86	37%	4.67	1.00	0.03	277
Thailand	3,371.72	27%	4.48	1.00	0.02	183
UK	36,379.15	67%	6.74	0.00	0.15	1,826
US	40,876.08	57%	6.51	0.00	0.29	4,194
Non-U.S.	28,236.40	49%	5.40		0.12	627
	(17,627.39)	(16%)	(0.83)		(0.11)	(843)
All Countries	28,657.72	49%	5.44		0.13	746
	(17,473.85)	(15%)	(0.84)		(0.11)	(1,054)

GDP per capita (GDPC) is used as the proxy for economic development as it reflects a country's economic performance. The GDPC is taken from the World Development Indicators database. After collecting the data, the median value of GDPC can be calculated and this is compared with the GDPC in the different countries to classify their level of economic development. A country with higher than median GDPC is considered more economically developed; others are classified as less developed countries. A country with higher GDP per capita indicates its economy has developed more quickly. We expect investors from countries with a higher median GDPC to buy fewer funds with foreign parents than funds with domestic parent.

The development of the mutual fund industry is measured using the mutual fund industry market cap and the number of funds in the mutual fund industry; the above method for classifying economic development through GDPC is also used to classify the degree of development of the mutual fund industry in each country. We expect that the dummy variable of funds with foreign parents will increase the convexity of the flow-performance relationship in countries with a lower median value of industry market cap and number of funds.

Financial development is measured by financial literacy, financial sophistication and emerging market. They are measured in the same way as the proxies of the mutual fund industry. Investors in countries with a higher level of financial literacy, financial sophistication and tend to more sophisticated; they are less sensitive to higher performance funds and more sensitive to low performance funds. I therefore expect the dummy variable of funds with foreign parents to increase the convexity of flow-performance relationship when a country has low financial development.

Detailed explanation regarding country level variables is presented in the Appendix.

Table 4 shows the country variable statistics country by country in the period 2001-2010. It shows that the economic, mutual fund industry, and financial development is greater in more developed countries and their investors tend to be more sophisticated. As we see like US, UK and Norway these developed countries with higher 40,000 million dollar GDP per capita, strongly suggest that these country have a wealthy economic situation, and the table also shows that these countries have higher level of financial development means that they are also get financial literacy access higher 50% sophisticated, and more mature market. Also these countries have more developed mutual fund industry. However, as for those countries which financial market is still in emerging market like India, Indonesia, and Thailand, they have less economic developed, most of them GDP per capita are less 10,000 million dollar and also the investors' financial literacy access and mutual fund industry market capitalization is also relatively low than mutual fund developed market.

We then split our sample into countries below and above median for each of the variables presented in Table 4, and run one regression for each subsample.[3] Because the US is by far the country with the highest number of funds and with the greatest TNA in our sample, we also run one regression where we exclude US funds. The results are presented in Table 5, Panels A, B, C.

[2]Regression include fund level control variables.

Table 5. The impact of the economic, financial market, and mutual fund industry development.

Panel A. Economic development measured by GDP per capita.

	Below	Above	
	All countries	All countries	Non-US
	(1)	(2)	(3)
Low t-1	4.9123**	6.6750***	5.7865***
	(0.03)	(0.00)	(0.00)
Low x foreign parent	-2.8913	3.5303*	4.4890*
	(0.43)	(0.09)	(0.06)
Mid t-1	3.4964***	4.1964***	2.2255***
	(0.00)	(0.00)	(0.00)
Mid x foreign parent	1.0854	-1.3673***	-0.2855
	(0.23)	(0.01)	(0.63)
High t-1	9.9594***	13.6123***	8.9033***
	(0.00)	(0.00)	(0.00)
High x foreign parent	9.1866**	-4.5022**	-1.7654
	(0.04)	(0.05)	(0.49)
Foreign parent	-0.1307	-0.1505	-0.5857
	(0.84)	(0.65)	(0.12)
Country fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes
Control variables include	Yes	Yes	Yes
Adjusted R-squared	0.066	0.065	0.042
Number of observations	86,959	251,809	161,183

,, and *** indicate significance at the 10%, 5%, and 1% level, respectively.*

Panel B. Financial development measured by Financial literacy, Financial sophistication, and Emerging market.

	Financial literacy			Financial sophistication			Emerging market		
	Below	Above		Below	Above		Yes	No	
	All countries	All countries	Non-US	All countries	All countries	Non-US	All countries	All countries	Non-US
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Low t-1	3.6923*	7.1665***	6.7138***	4.1464**	7.0195***	6.4038***	6.9987***	3.2853	6.3627***
	(0.08)	(0.00)	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)	(0.39)	(0.00)
Low x foreign parent	-4.7186	3.5265*	4.0991*	-4.4816	4.0800**	4.9611**	3.6042**	-13.8431*	4.2806**
	(0.24)	(0.07)	(0.07)	(0.20)	(0.05)	(0.04)	(0.05)	(0.05)	(0.04)
Mid t-1	2.4534***	4.5381***	2.7988***	1.7979***	4.9579***	3.3842***	4.0675***	4.5968***	2.4708***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Mid x foreign parent	1.2933	-1.1435**	-0.0651	1.5424*	-1.3295**	-0.3707	-1.2230***	1.6820	-0.2774
	(0.18)	(0.03)	(0.91)	(0.07)	(0.01)	(0.54)	(0.01)	(0.30)	(0.58)
High t-1	7.0272***	14.7813***	10.6692***	5.1168**	16.0097***	12.4499***	12.7291***	14.7276***	8.3963***
	(0.01)	(0.00)	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
High x foreign parent	7.4951*	-3.4740	-0.7554	7.0561*	-3.6004	-1.0253	-2.0397	8.6997	1.1576
	(0.08)	(0.14)	(0.78)	(0.06)	(0.14)	(0.71)	(0.33)	(0.27)	(0.61)
Foreign parent	0.6228	-0.4308	-0.8315**	0.3702	-0.4250	-0.7892**	-0.3472	2.2238*	-0.7424**
	(0.37)	(0.18)	(0.02)	(0.54)	(0.21)	(0.04)	(0.25)	(0.06)	(0.03)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables include	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.083	0.054	0.031	0.076	0.055	0.030	0.057	0.123	0.038
Number of observations	77968	260800	170174	94319	244449	153823	305402	33366	214776

, **, and * indicate significance at the 10%, 5%, and 1% level, respectively.*

Panel C. Mutual fund industry development measured by the mutual funds industry market capitalization and number of funds in mutual funds industry.

	The mutual funds industry market capitalization			The mutual funds industry number of funds		
	Below	Above		Below	Above	
	All countries	All countries	Non-U.S	All countries	All countries	Non-U.S
	(1)	(2)	(3)	(4)	(5)	(6)
Low t-1	1.8982	7.3737***	7.0378***	7.0831***	6.2245***	5.0928***
	(0.49)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Low x foreign parent	-2.3556	2.5528	2.8394	-1.7743	1.9347	2.5605
	(0.63)	(0.18)	(0.19)	(0.69)	(0.33)	(0.26)
Mid t-1	3.5199***	4.1878***	2.4388***	2.8523***	4.2052***	2.6166***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Mid x foreign parent	1.3759	-1.2011**	-0.1441	-0.0679	-0.6208	0.4782
	(0.24)	(0.01)	(0.79)	(0.94)	(0.24)	(0.42)
High t-1	10.4443***	13.3224***	8.6962***	4.7195*	14.4005***	10.7957***
	(0.00)	(0.00)	(0.00)	(0.07)	(0.00)	(0.00)
High x foreign parent	10.0858*	-3.1323	0.0355	8.9993*	-2.2506	0.5399
	(0.06)	(0.16)	(0.99)	(0.07)	(0.32)	(0.83)
Foreign parent	-0.1392	-0.1282	-0.4688	-0.0648	-0.1758	-0.5841
	(0.87)	(0.68)	(0.18)	(0.93)	(0.59)	(0.11)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
control variables include	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.087	0.058	0.037	0.054	0.069	0.052
Number of observations	58949	279819	189193	52361	286407	195781

, **, and * indicate significance at the 10%, 5%, and 1% level, respectively.*

As noted before, GDP per capita (GDPC) has been presented in the literature as one of the best indicators to show a country's economic development. Table 5, Panel A, shows that in countries with higher than median GDPC, the interaction of foreign parent dummy and low performance is positive and statistically significant, meaning that in more developed countries, investors sell more poor performers that have a foreign parent. The coefficient is also economically significant as the sensitivity of fund flow to poor performers with a foreign parent is nearly 1.6 times higher ((3.53+6.68) / 6.68) than the sensitivity of fund flow to poor performers with a domestic parent. On the opposite, the coefficient on the interaction between foreign parent dummy variable and high performance is negative and statistically significant. In more developed countries investors buy fewer funds with foreign parents even if they have a good performance. Looking at the economic impact, the flow-performance sensitivity of top performer funds with a foreign parent decreases 0.6 times when compared to top performers with a domestic parent. These results show that, in more developed countries, funds with a foreign parent have a less convex flow-performance relationship. The results remain similar if we exclude the US from the sample.

In less developed countries (countries with lower than median GDPC), however, funds with foreign parents increase the convexity of flow-performance relationship. This is because investors tend to buy more funds that perform well and sell less funds that perform poorly. The interaction between foreign parent dummy variable and high performance is positive and statistically and economically significant as the flow-performance sensitivity of top performer funds with a foreign parent increases 1.6 times. The interaction between foreign parent dummy variable and poor performance is negative although not significant.

Table 5, Panel B, shows that in countries with higher than median financial literacy, financial sophistication and non-emerging markets, the interaction of foreign parent dummy and low performance is positive and statistically significant, meaning that in more developed countries, investors sell more poor performers that have a foreign parent, and the sensitivity of fund flow to poor performers with a foreign parent is nearly 1.5 times than it to the domestic parent. On the other hand, the coefficient on the interaction between foreign parent dummy variable and high performance is non-significant. In more developed countries investors do not distinguish between good performers with or without a foreign parent. The results remain similar if we exclude the US from the sample.

In less developed countries (countries with lower than median financial literacy, financial sophistication and emerging markets), however, funds with foreign parents increase the convexity of flow-performance relationship, and the sensitivity of fund flow to performance shows totally opposite situation. For example the sensitivity of financial literacy when foreign fund perform well is near 2 times to fund with domestic parents when it has good performance, it consistent our study. And we also find when the mutual fund market is still emerging market, the flow-performance relationship more convex than country in the developed market. This is mostly because, for funds with a foreign parent, investors tend to buy more funds that perform well. The interaction between foreign parent dummy variable and high performance is positive and statistically significant. The interaction between foreign parent dummy variable and poor performance is negative although only statically significant for emerging markets.

Table 5 Panel C shows the results for the regressions for mutual fund industry development. In less developed countries, those with below median mutual fund

industry market capitalization and below median number of funds in mutual fund industry, the interaction of foreign parent dummy and high performance is positive and statically significant. The coefficient of mutual fund industry market capitalization is also economically significant as the sensitivity of fund flow to high performers with a foreign parent is nearly 1.96 times higher than the sensitivity of fund flow to high performers with a domestic parent. It suggest that when fund with foreign parents will be pursued by investors in less developed country.

This is because, in these countries, investors tend to buy more funds that perform well when they have a foreign parent, increasing the flow-performance convexity. However, having a foreign parent does not seem to have a significant impact in the countries where mutual fund industry market capitalization and the number of funds in mutual fund industry are above median.

Overall, our results confirm what we would expect. Funds with a foreign parent increase the flow-performance convexity in less developed countries, with less sophisticated investors and where the mutual fund industry is less developed.

6. Robustness

In the section 5.2, we have explained the investors from the country with different developed level have different favor to funds with their parents. However, the results only show this when the fund performance is measured using four-factor alpha. We therefore rerun these regressions in Table 5, Panel A, B, and C, using raw returns and one-factor alpha. The results are presented in Appendix II, Table 6.

We find that when raw returns and one-factor alpha are used as performance measures, and the results are consistent with our main findings.

7. Conclusion

The relationship between mutual fund flow and mutual fund performance is a hot topic in the academic world. Although many papers have discussed the shape of this relationship, from linearity to convexity, most have focused primarily on the US mutual fund industry and only a few have studied this relationship outside the US. In our study, We contribute to this area by testing the influence of funds with foreign parents on the sensitivity of fund flow to performance using a worldwide sample of 31 countries. This is measured through a dummy variable that equals one for funds with foreign parents. We then use a country-level variable proxy by economic, financial and mutual industry development to explain why investors in different countries react differently to funds with foreign parents. We show that the flow-performance relationship is convex using a worldwide sample, which is consistent with previous studies. We show that funds with foreign parents increase the convexity of the flow-performance relationship in countries with less developed economies and financial markets, and where investors are less sophisticated. We show the robustness of our results by re-running the results using different performance measurements.

References

Berk,J. B., and C. Green. 2004. Mutual fund flows and performance in rational markets. ***Journal of Political Economy***, 112: 1269-1295

Busse, J., Goyal, A., and Wahal, S. 2014. Investing in a global world. ***Review of Finance***, 18: 561-590.

Bergstresser , D., & Poterba, J. 2002. Do after-tax returns affect mutual fund inflows? ***Journal of Financial Economics***, 63: 381-414

Brennan, M., & P.Hughes. 1991. Stock Prices and the supply of information. ***Journal of Finance***, 46: 1665-1691.

Chen, Joseph S., Harrison G. Hong, Ming Huang, and Jeffrey D. Kubik. 2004. Does fund size erode mutual fund performance? The role of liquidity and organization. ***American Economic Review***, 94: 1276-1302

Carhart, M. 1997. On Persistence in Mutual Fund Performance. ***The Journal of Finance,*** 52(1), 57-82.

Chevalier, J., & Ellison, G. 1997. Risk Taking by Mutual Funds as a Response to Incentives. ***Journal of Political Economy***, 105(6), 1167-1200.

Droms, W., & Walker, D. 2001. Persistence of mutual fund operating characteristics: returns, turnover rates, and expense ratios. Applied Financial Economics, 11(4), 457-466.

Ferreira M., A. Keswani, A. Miguel, and S. Ramos. 2012. The flow-performance relationship around the world. ***Journal of Banking and Finance***, 36: 1759-1780.

Guedj., & J Papastaikoudi. 2003. Can mutual fund families affect the performance of their funds? ***MIT - Sloan School of Management***, 78712

Gelos, G. 2013. International mutual funds, capital flow volatility, and contagion–a survey. ***The Evidence and Impact of Financial Globalization***, 131-143.

Greene, J. T., and C. W. Hodges. 2002. The dilution impact of daily fund flows on open-end mutual funds. ***Journal of Financial Economics***, 65: 131-158.

HUANG, J., WEI, K., & YAN, H. (2007). Participation Costs and the Sensitivity of Fund Flows to Past Performance. ***The Journal of Finance***, 62(3), 1273-1311.

Hiraki,T. Liu, M. Wang, X. 2015. Country and industry concentration and the performance of international mutual funds. ***Journal of Banking & Finance***, 59: 297-310

Reuter, J., & Zitzewitz, E. 2015. ***How much does size erode mutual fund performance? A regression discontinuity approach.*** Working Paper Boston College.

Kempf, A., & Ruenzi, S. 2008. Family Matters: Rankings Within Fund Families and Fund Inflows***. Journal of Business Finance & Accounting***, 35(1-2), 177-199.

Khorana, A., & Servaes, H. (1999). The Determinants of Mutual Fund Starts***. Review of Financial Studies***, 12(5), 1043-1074.

Kumar, A. Niessen-Ruenzi, A. and Spalt, O. G.2015. What's in a Name? Mutual Fund Flows When Managers Have Foreign-Sounding Names. ***Review of Financial Studies***, 28:2281-2321

Keswani, A. Ferreira M., and S. Ramos. 2016. ***Lazy Investors, Lazy Fund Managers, Lousy Performance: Culture and Mutual Fund Management.*** Working paper. Faculty of Finance, Cass Business School, City University, London.

Kim, M. 2010. ***Changes in mutual fund flows and managerial incentives.*** Working paper, University of Southern California.

Massa, M. 2003. How do family strategies affect fund performance? When performance-maximization is not the only game in town***. Journal of Financial Economics***, 67:249-304

Nanda, V. Wang, Z. J. Zheng, l. 2004. Family values and the star phenomenon: Strategies of mutual fund families. ***Review of Financial Studies***, 17: 667-698

Sirri, E., & Tufano, P. 1998. Costly Search and Mutual Fund Flows. The ***Journal of Finance***, 53(5), 1589-1622.

Spiegel, M., & Zhang, H. (2013). Mutual fund risk and market share-adjusted fund flows. ***Journal of Financial Economics***, 108(2), 506-528.

Van Campenhout, G. 1998. ***Aggregate equity fund flows and the stock market***. Working paper. Department of Accounting and Finance, University of Antwerp, Prinsstraat 13, B-2020 Antwerp, Belgium

Zhao, X. 2008. Determinants of flows into retail international equity funds. ***Journal of International Business Studies***, 39: 1169-1177.

Appendix I: Variables definitions

Panel A: fund characteristics

Variable	Definition
Raw return	Fund net return in US dollars (percentage per quarter).
One-factor alpha	One-factor alpha (percentage per quarter) estimated with three years of past monthly fund excess returns in US dollars and regional factors (Asia, Europe and North America) or world factors in the case of global funds.
Four-factor alpha	Four-factor alpha (percentage per quarter) estimated with three years of past monthly fund excess returns in US dollars and regional factors (Asia, Europe and North America) or world factors in the case of global funds.
TNA	Total net assets in millions of US dollars (Lipper).
TNA family	Family total net assets in millions of US dollars of other equity funds in the same management company excluding the own fund TNA (Lipper).
Age	Number of years since the fund launch date (Lipper).
Expense ratio	Total annual expenses as a fraction of TNA (Lipper).
Fund fee	Total shareholder charges estimated by adding the expense ratio plus annualized loads (Lipper): Total shareholder charges = Expense ratio + (Front-end load)/5 + (Back-end load)/5
Flow	Percentage growth in TNA (in local currency) in a quarter, net of internal growth (assuming reinvestment of dividends and distributions)
Foreign parent	Dummy variable that takes the value of one if the domicile country of the fund management company differs from the fund domicile
Fund nationality	To see if the fund is from a different country
Tracking error	Standard deviation (percentage per quarter) of the residuals from the four-factor model estimated with three years of past monthly fund excess returns in US dollars and regional factors (Asia, Europe and North America) or world factors in the case of global funds.

R-squared	R-squared from the four-factor model estimated with three years of past monthly fund excess returns in US dollars and regional factors (Asia, Europe and North America) or world factors in the case of global funds.
Standard deviation	Standard deviation (percentage per quarter) of fund returns estimated with three years of past monthly fund returns in local currency.
SMB	Loadings on the small minus big size factor (SMB) from four-factor alpha regressions. For domestic funds, we use the domestic SMB from the domestic four-factor alpha regressions, for regional funds we use the regional SMB from the four-factor alpha calculated using the region specific factors, and for global funds we use the SMB from the four-factor alpha calculated using global factors.
HML	Loadings on the high minus low factor (HML) from four-factor alpha regressions. For domestic funds, we use the domestic HML from the domestic four-factor alpha regressions, for regional funds we use the regional HML from the four-factor alpha calculated using the region specific factors, and for global funds we use the HML from the four-factor alpha calculated using global factors.

Panel B: country characteristics

GDP per Capita	Gross domestic product per capita in US. dollars (WDI)
Financial literacy	Percentage of adults who are financially literate (Klapper, Lusardi, and Oudheusden, 2015).
Financial sophistication	Survey-measure of financial sophistication (GCR)
Emerging market	A dummy variable if the value equal one means that the country is an emerging market (Emerging market dummy) as defined by MSCI Barra
Mutual fund industry market cap	The size of the mutual fund equity industry (from ICI) as a percentage of the stock market capitalization (from World Development Indicators).

Appendix II: Robustness

Table 6. The impact of the economic, financial market, and mutual fund industry development, using raw return as performance measure.

Panel A. Economic development

	Below	Above	
	All countries	All countries	Non-US
	(1)	(2)	(3)
Low t-1	4.3642**	6.0951***	7.3663***
	(0.04)	(0.00)	(0.00)
Low x foreign parent	2.6346	0.9918	-0.7257
	(0.46)	(0.64)	(0.77)
Mid t-1	5.2450***	5.6153***	3.3904***
	(0.00)	(0.00)	(0.00)
Mid x foreign parent	-1.8038*	-1.5402***	0.0937
	(0.06)	(0.00)	(0.87)
High t-1	20.6424***	16.1377***	11.7823***
	(0.00)	(0.00)	(0.00)
High foreign parent	10.9605**	-0.8736	1.3477
	(0.01)	(0.73)	(0.64)
Foreign parent	-0.3352	0.2345	0.1302
	(0.57)	(0.51)	(0.75)
Country fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes
Control variables include	Yes	Yes	Yes
Adjusted R-squared	0.072	0.070	0.045
Number of observations	86959	251809	161183

, **, and * indicate significance at the 10%, 5%, and 1% level, respectively.*

Panel B. Financial development

	Financial literacy			Financial sophistication			Emerging market		
	Below	Above		Below	Above		Yes	No	
	All countries	All countries	Non-US	All countries	All countries	Non-US	All countries	All countries	Non-US
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Low t-1	0.5166	7.1200***	9.1518***	1.3384	7.1779***	9.5108***	1.3384	7.1779***	9.5108***
	(0.81)	(0.00)	(0.00)	(0.47)	(0.00)	(0.00)	(0.47)	(0.00)	(0.00)
Low x foreign parent	1.1766	1.4396	-0.6474	2.1223	0.8250	-1.6779	2.1223	0.8250	-1.6779
	(0.77)	(0.47)	(0.78)	(0.55)	(0.69)	(0.49)	(0.55)	(0.69)	(0.49)
Mid t-1	4.2809***	5.9538***	3.9233***	3.5408***	6.3124***	4.3605***	3.5408***	6.3124***	4.3605***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Mid x foreign parent	-2.2658**	-1.3186***	0.2751	-1.9038**	-1.2610**	0.3647	-1.9038**	-1.2610**	0.3647
	(0.02)	(0.01)	(0.63)	(0.04)	(0.02)	(0.53)	(0.04)	(0.02)	(0.53)
High t-1	15.2227***	18.1114***	14.7697***	13.0079***	19.2207***	16.4345**	13.0079***	19.2207***	16.4345***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
High x foreign parent	10.8116**	0.4067	2.5231	9.5829**	0.6283	2.5610	9.5829**	0.6283	2.5610
	(0.02)	(0.87)	(0.35)	(0.03)	(0.80)	(0.36)	(0.03)	(0.80)	(0.36)
Foreign parent	0.5766	-0.1405	-0.1992	0.1424	-0.0001	0.0614	0.1424	-0.0001	0.0614
	(0.38)	(0.68)	(0.60)	(0.80)	(1.00)	(0.88)	(0.80)	(1.00)	(0.88)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables include	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.087	0.060	0.036	0.079	0.061	0.035	0.079	0.061	0.035
Number of observations	77968	260800	170174	94319	244449	153823	94319	244449	153823

,, and *** indicate significance at the 10%, 5%, and 1% level, respectively.*

Panel C. Mutual fund industry development.

	The mutual funds industry market capitalization			The mutual funds industry number of funds		
	Below	Above		Below	Above	
	All countries	All countries	Non-US	All countries	All countries	Non-US
	(1)	(2)	(3)	(4)	(5)	(6)
Low t-1	8.6497***	5.3057***	5.7511***	0.3492	6.8291***	8.4580***
	(0.00)	(0.00)	(0.00)	(0.90)	(0.00)	(0.00)
Low x foreign parent	-2.9800	1.8706	0.8064	5.8379	0.3750	-1.5790
	(0.48)	(0.35)	(0.73)	(0.22)	(0.85)	(0.46)
Mid t-1	4.1134***	5.7363***	3.9654***	6.0602***	5.4921***	3.4214***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Mid x foreign parent	-0.6574	-1.7697***	-0.4262	-3.3583***	-1.3301***	0.2566
	(0.50)	(0.00)	(0.47)	(0.00)	(0.01)	(0.62)
High t-1	15.8414***	17.8532***	15.0052***	15.8004***	17.7001***	14.3547***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
High x foreign parent	7.2363	2.3314	4.5695	18.5656***	-0.7557	1.2839
	(0.13)	(0.35)	(0.10)	(0.00)	(0.74)	(0.61)
Foreign parent	0.3341	0.0406	-0.1232	-0.3627	0.1917	0.1225
	(0.66)	(0.90)	(0.74)	(0.66)	(0.55)	(0.73)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Control variables include	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.060	0.074	0.056	0.092	0.064	0.042
Number of observations	52361	286407	195781	58949	279819	189193

, **, and * indicate significance at the 10%, 5%, and 1% level, respectively.*

Table7. The impact of the economic, financial market, and Mutual fund industry development, using one factor as a performance measure.

Panel A. Economic development

	Below	Above	
	All countries	All countries	Non-us
	(1)	(2)	(3)
Low t-1	8.4189***	7.5512***	8.9191***
	(0.00)	(0.00)	(0.00)
Low x foreign parent	-5.9924*	-1.2088	-2.0753
	(0.08)	(0.57)	(0.39)
Mid t-1	3.1067***	4.9988***	2.3719***
	(0.00)	(0.00)	(0.00)
Mid x foreign parent	2.1547**	-0.9980**	0.7680
	(0.02)	(0.03)	(0.13)
High t-1	22.455***	16.6495***	13.0283***
	(0.00)	(0.00)	(0.00)
High x foreign parent	4.4185	-3.8165*	-2.1006
	(0.34)	(0.09)	(0.39)
Foreign parent	0.1972	0.5795	0.2831
	(0.73)	(0.11)	(0.49)
Country fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes
Control variables include	Yes	Yes	Yes
Adjusted R-squared	0.071	0.070	0.044
Number of observations	86959	251809	161183

, **, and * indicate significance at the 10%, 5%, and 1% level, respectively.*

Panel B. Financial development

	The mutual funds industry market capitalization			The mutual funds industry number of funds		
	Below	Above		Below	Above	
	All countries	All countries	Non-US	All countries	All countries	Non-US
	(1)	(2)	(3)	(4)	(5)	(6)
Low t-1	8.6497***	5.3057***	5.7511***	0.3492	6.8291***	8.4580***
	(0.00)	(0.00)	(0.00)	(0.90)	(0.00)	(0.00)
Low x foreign parent	-2.9800	1.8706	0.8064	5.8379	0.3750	-1.5790
	(0.48)	(0.35)	(0.73)	(0.22)	(0.85)	(0.46)
Mid t-1	4.1134***	5.7363***	3.9654***	6.0602***	5.4921***	3.4214***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Mid x foreign parent	-0.6574	-1.7697***	-0.4262	-3.3583***	-1.3301***	0.2566
	(0.50)	(0.00)	(0.47)	(0.00)	(0.01)	(0.62)
High t-1	15.8414***	17.8532***	15.0052***	15.8004***	17.7001***	14.3547***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
High x foreign parent	7.2363	2.3314	4.5695	18.5656***	-0.7557	1.2839
	(0.13)	(0.35)	(0.10)	(0.00)	(0.74)	(0.61)
Foreign parent	0.3341	0.0406	-0.1232	-0.3627	0.1917	0.1225
	(0.66)	(0.90)	(0.74)	(0.66)	(0.55)	(0.73)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Control variables include	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.060	0.074	0.056	0.092	0.064	0.042
Number of observations	52361	286407	195781	58949	279819	189193

, **, and * indicate significance at the 10%, 5%, and 1% level, respectively.*

Panel C. Mutual fund industry development

	the mutual funds industry market capitalization			the mutual funds industry number of funds		
	Below	Above		Below	Above	
	All countries	All countries	Non-US	All countries	All countries	Non-US
	(1)	(2)	(3)	(4)	(5)	(6)
Low t-1	6.5803**	8.1516***	9.6390***	10.5238***	7.4234***	8.2791***
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Low x foreign parent	-4.0381	-2.3003	-3.5144	-4.6677	-2.4860	-3.4548
	(0.36)	(0.24)	(0.11)	(0.28)	(0.21)	(0.12)
Mid t-1	3.8506***	4.7718***	2.2649***	2.9924***	4.8114***	2.5040***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Mid x foreign parent	0.6132	-0.4217	1.4169***	0.1786	-0.1058	1.6883***
	(0.61)	(0.36)	(0.00)	(0.86)	(0.83)	(0.00)
High t-1	18.7352***	17.8752***	15.2588***	13.1405***	19.0885***	17.4224***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
High x foreign parent	12.1504**	-4.3125**	-2.9216	9.8378*	-3.0883	-2.1614
	(0.04)	(0.05)	(0.21)	(0.06)	(0.18)	(0.39)
Foreign parent	0.3429	0.5274	0.2564	0.3720	0.4759	0.1824
	(0.64)	(0.11)	(0.49)	(0.61)	(0.16)	(0.63)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Control variables include	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.091	0.063	0.040	0.058	0.073	0.055
Number of observations	58949	279819	189193	52361	286407	195781

, **, and * indicate significance at the 10%, 5%, and 1% level, respectively.*

Appendix III

Table 8. Using four factor alpha as performance measurement in different regression model to test flow-performance relationship

Panel A. linear regression model

	Four-factor alpha					
	All		Non-US		US	
	(1)	(2)	(3)	(4)	(5)	(6)
Performance	5.0452***	5.1410***	3.8168***	3.6099***	7.0287***	7.0646***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Performance rank x foreign parent		-0.3882		0.6886**		-0.3418
		(0.24)		(0.04)		(0.61)
Foreign parent	-0.0795	0.1155	-0.0025	-0.3487	-0.6014***	-0.4307
	(0.51)	(0.57)	(0.99)	(0.11)	(0.00)	(0.20)
Foreign fund	0.2061	0.2056	0.0100	0.0096	2.5448**	2.5339**
	(0.17)	(0.17)	(0.95)	(0.95)	(0.02)	(0.02)
Log Size	-0.5408***	-0.5408***	-0.5032***	-0.5031***	-0.6039***	-0.6040***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log Family Size	0.1618***	0.1616***	0.0814**	0.0813**	0.2508***	0.2507***
	(0.00)	(0.00)	(0.04)	(0.04)	(0.00)	(0.00)
Log Age	-0.7323***	-0.7320***	-0.5863***	-0.5872***	-0.7705***	-0.7707***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Fee	-0.0682*	-0.0679*	-0.0110	-0.0114	-0.1202***	-0.1200***
	(0.06)	(0.06)	(0.83)	(0.83)	(0.00)	(0.00)
Flows	0.1622***	0.1621***	0.1255***	0.1255***	0.2941***	0.2941***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
SMB	-0.0057	-0.0043	-0.0524	-0.0532	0.0287	0.0289
	(0.98)	(0.98)	(0.83)	(0.83)	(0.90)	(0.90)
HML	1.3520***	1.3509***	0.9363***	0.9365***	1.9848***	1.9840***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Countries fund sold	0.3579***	0.3582***	0.3656***	0.3652***	0.8812***	0.8826***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.064	0.064	0.050	0.050	0.144	0.144
Number of observations	338768	338768	248142	248142	90626	90626

, **, and * indicate significance at the 10%, 5%, and 1% level, respectively.*

Panel B. Two-piecewise linear regression model

	Four-factor alpha					
	All		Non-US		US	
	(1)	(2)	(3)	(4)	(5)	(6)
Low t-1	6.7261***	6.3720***	5.9247***	5.4020***	7.2314***	7.0128***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Low x foreign parent		1.4471		1.7147		2.0476
		(0.42)		(0.40)		(0.57)
Mid t-1	3.8690***	4.0127***	2.7468***	2.6415***	5.9048***	5.9508***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Mid x foreign parent		-0.5857		0.3555		-0.4491
		(0.21)		(0.48)		(0.66)
High t-1	12.5529***	12.7201***	10.0306***	9.3670***	15.8108***	16.0276***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
High x foreign parent		-0.6778		2.1915		-1.9945
		(0.75)		(0.34)		(0.70)
Foreign parent	-0.0776	-0.1478	0.0001	-0.4614	-0.6020***	-0.7956
	(0.52)	(0.62)	(1.00)	(0.16)	(0.00)	(0.18)
Foreign funds	0.1460	0.1461	-0.0414	-0.0418	2.3993**	2.3850**
	(0.33)	(0.33)	(0.79)	(0.79)	(0.03)	(0.03)
Log Size	-0.5369***	-0.5367***	-0.5027***	-0.5024***	-0.5912***	-0.5904***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log Family Size	0.1615***	0.1615***	0.0826**	0.0826**	0.2459***	0.2456***
	(0.00)	(0.00)	(0.04)	(0.04)	(0.00)	(0.00)
Log Age	-0.7218***	-0.7218***	-0.5802***	-0.5809***	-0.7633***	-0.7656***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Fee	-0.0677*	-0.0673*	-0.0110	-0.0115	-0.1180***	-0.1174***
	(0.06)	(0.06)	(0.83)	(0.83)	(0.00)	(0.00)
Flows	0.1615***	0.1615***	0.1251***	0.1251***	0.2922***	0.2922***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
SMB	-0.0856	-0.0837	-0.1043	-0.1051	-0.1597	-0.1607
	(0.71)	(0.72)	(0.67)	(0.67)	(0.50)	(0.49)
HML	1.3977***	1.3966***	0.9739***	0.9742***	2.0576***	2.0566***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Countries fund sold	0.3546***	0.3549***	0.3630***	0.3625***	0.8843***	0.8843***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.064	0.064	0.050	0.050	0.144	0.144
Number of observations	338768	338768	248142	248142	90626	90626
Wald test βHigh=βLow (p-value)	0.0001		0.0061		0.0001	

, **, and * indicate significance at the 10%, 5%, and 1% level, respectively.*

Panel C. Three-piecewise linear regression model

	Four-factor alpha					
	All		Non-US		US	
	(1)	(2)	(3)	(4)	(5)	(6)
Low t-1	6.7261***	6.3720***	5.9247***	5.4020***	7.2314***	7.0128***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Low x foreign parent		1.4471		1.7147		2.0476
		(0.42)		(0.40)		(0.57)
Mid t-1	3.8690***	4.0127***	2.7468***	2.6415***	5.9048***	5.9508***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Mid x foreign parent		-0.5857		0.3555		-0.4491
		(0.21)		(0.48)		(0.66)
High t-1	12.5529***	12.7201***	10.0306***	9.3670***	15.8108***	16.0276***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
High x foreign parent		-0.6778		2.1915		-1.9945
		(0.75)		(0.34)		(0.70)
Foreign parent	-0.0776	-0.1478	0.0001	-0.4614	-0.6020***	-0.7956
	(0.52)	(0.62)	(1.00)	(0.16)	(0.00)	(0.18)
Foreign fund	0.1460	0.1461	-0.0414	-0.0418	2.3993**	2.3850**
	(0.33)	(0.33)	(0.79)	(0.79)	(0.03)	(0.03)
Log Size	-0.5369***	-0.5367***	-0.5027***	-0.5024***	-0.5912***	-0.5904***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log Family Size	0.1615***	0.1615***	0.0826**	0.0826**	0.2459***	0.2456***
	(0.00)	(0.00)	(0.04)	(0.04)	(0.00)	(0.00)
Log Age	-0.7218***	-0.7218***	-0.5802***	-0.5809***	-0.7633***	-0.7656***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Fee	-0.0677*	-0.0673*	-0.0110	-0.0115	-0.1180***	-0.1174***
	(0.06)	(0.06)	(0.83)	(0.83)	(0.00)	(0.00)
Flows	0.1615***	0.1615***	0.1251***	0.1251***	0.2922***	0.2922***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
SMB	-0.0856	-0.0837	-0.1043	-0.1051	-0.1597	-0.1607
	(0.71)	(0.72)	(0.67)	(0.67)	(0.50)	(0.49)
HML	1.3977***	1.3966***	0.9739***	0.9742***	2.0576***	2.0566***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Countries fund sold	0.3546***	0.3549***	0.3630***	0.3625***	0.8843***	0.8843***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.064	0.064	0.050	0.050	0.144	0.144
Number of observations	338768	338768	248142	248142	90626	90626
Wald test βHigh=βLow (p-value)	0.0001		0.0061		0.0001	

, **, and * indicate significance at the 10%, 5%, and 1% level, respectively.*