The Flow-Performance Relationship Around the World*

Miguel A. Ferreira†
Universidade Nova de Lisboa

Aneel Keswani‡
Cass Business School - London

Antonio F. Miguel§
ISCTE - Lisbon University Institute

Sofia B. Ramos**
ISCTE - Lisbon University Institute

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† Faculdade de Economia, Universidade Nova de Lisboa, Campus de Campolide 1099-032 Lisboa, Portugal; Email: miguel.ferreira@fe.unl.pt

‡ Cass Business School; 106 Bunhill Row London EC1Y 8TZ, United Kingdom; Email: a.keswani@city.ac.uk

§ ISCTE-Lisbon University Institute – Lisbon, Av. Forcas Armadas 1649-026 Lisboa, Portugal; Email: a.freitasmiguel@iscte.pt

** ISCTE-Lisbon University Institute – Lisbon, Av. Forcas Armadas 1649-026 Lisboa, Portugal; Email: sofia.ramos@iscte.pt

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Abstract

We use a new dataset to study how mutual fund flows depend on past performance across 28 countries. We show that there are marked differences in the flow-performance relationship across countries, suggesting that U.S. findings concerning its shape do not apply universally. We find that mutual fund investors sell losers more and buy winners less in more developed countries. This is because investors in more developed countries are more sophisticated and face lower costs of participating in the mutual fund industry. Higher country-level convexity is positively associated with higher levels of risk taking by fund managers.

JEL Classification: G15; G23

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1. Introduction

There are numerous papers that have studied how flows depend on past performance using U.S. mutual fund flow data (e.g., Ippolito (1992), Sirri and Tufano (1998), and Del Guercio and Tkac (2002)). Most concur that flows are highly dependent on past performance and that U.S. investors chase winners more intensely than they sell poorly performing funds.

The interest in the flow-performance relationship stems from three main sources. First, fund flows determine the assets under management of fund management companies and hence their fees; this means that the flow-performance relationship is paramount for fund families to understand. Second, the literature has also highlighted that if that the flow performance relationship is convex that this may encourage fund manager risk taking to increase the likelihood that they are winners. Third, the way flows respond to past performance also matters as it has implications for fund persistence. This is because it will determine the degree to which fund size is affected by past performance which conditions how a fund performs in the future (Berk and Green (2004)).

The mutual fund industry has been influential in the U.S. financial market for some time, and this is also now the case in many other countries around the world (Khorana, Servaes, and Tufano (2005)).[1] The far-reaching influence of the mutual fund industry in most economies suggests that the dependence of flows on past performance will have implications for the risk and return that investors experience in stock and bond markets. Yet we have little idea of how

[1] At the end of 2007, the world mutual fund industry managed financial assets exceeding $26 trillion (including over $12 trillion in stocks), more than four times the $6 trillion of assets managed at the end of 1996 (Investment Company Institute (2009)). The number of mutual funds has also grown dramatically, to more than 66,000 funds worldwide at the end of 2007. The world share of assets under management outside the U.S. grew from 38% in 1997 to 54% in 2007.

this dependence varies around the world, as there is scant work on mutual fund flows beyond the U.S. We aim to fill this void and to provide new insights into the flow-performance relationship around the world, in particular, to understand what determines the shape that we observe.[2]

We use a worldwide sample of mutual funds to investigate why the intensity with which investors buy past winners and sell past losers differs across countries. The focus is the role of economic, financial, and mutual fund industry development in shaping the flow-performance relationship around the world. Relating the nature of this relationship to the diverse development levels across countries in our sample is important, because this sheds light on its likely evolution within countries. This would be difficult to see using individual country data rather than a sample of countries at different stages of development.

There are several possible explanations for why flow-performance sensitivities differ across countries, and these can all be related to levels of development. Investors may chase past favorable performance because they put more weight on the latest fund performance information or fail to sell losers because they tend to shade the latest performance information upward when a fund they have purchased underperforms (Goetzmann and Peles (1997)). Investors may also buy into past winners and not sell past losers because fund families tend to advertise funds that have recently outperformed rather than drawing attention to poorly performing funds (Sirri and Tufano (1998)).[3] This suggests that investor sophistication can explain the levels of flow-performance sensitivities observed as more sophisticated investors will be less behaviorally biased and will not be persuaded by advertising. Indeed, the U.S. literature has shown that not

[2] There are a limited number of studies on fund flows outside the U.S. Dahlquist, Engström, and Söderlind (2000) study Sweden, while Keswani and Stolin (2008) study the U.K.

[3] There are other explanations for why investors do not sell underperformers. Lynch and Musto (2003) argue that investors may be reluctant to sell poorly performing funds because they expect failing funds will change their managers or their investment strategy.

chasing winners and selling losers is a sensible thing for fund investors to do (Hendricks, Patel, and Zeckhauser (1993), Brown and Goetzmann (1995), and Carhart (1997)). We confirm this is also the case in our worldwide sample of mutual funds.[4]

We expect mutual fund investors in developed countries to be more familiar with financial products owing to the greater development of their financial markets. In addition, these investors should also have a better understanding of mutual funds, not only because the mutual fund industry is typically older but also because it is larger and more pervasive in their countries. Khorana, Servaes, and Tufano (2005) find larger fund industries in countries with wealthier and more educated populations. Finally, we expect investors in countries with higher education levels and more advanced development to be more able to process the information when dealing with mutual funds. For these reasons mutual fund investors in more developed countries are likely to be more sophisticated than investors in less developed countries.

Huang, Wei, and Yan (2007) discuss the role of mutual fund participation costs in shaping the flow-performance relationship. They argue that the higher the participation costs (whether transaction or information costs) the higher the rate of return a fund must earn before a large number of investors choose the fund. As a result, funds with higher participation costs will have a more convex flow-performance relationship at the upper end of the performance scale.

Translating these ideas from the fund level to the country level, when we compare countries with different levels of average participation costs, we could expect to see more convexity in

[4] We sort funds in each country into quintiles based on risk-adjusted performance and calculate the returns to buying prior year winners and losers. We find that in most countries that buying the prior year’s winners does not lead to positive and significant risk-adjusted returns while buying the past year's losers results in significantly negative abnormal returns. This suggests that buying winners does not pay off while selling losers does.

countries with higher average participation costs. Huang, Wei, and Yan (2007) look at how convexity has changed over time for U.S. mutual funds by comparing convexity in 1981-1989 and 1990-2001. They argue that as a result of investors becoming better informed over time that we might expect average participation costs to decline over time. They therefore acknowledge that the aggregate flow-performance relationship in a given country may be explained by the average level of participation costs. This is the intuition we apply in our work.

How do we expect participation costs to vary with development? Khorana, Servaes, and Tufano (2009) show that mutual fund fees are lower in more developed countries. In addition, we might expect that in more developed markets, the convenience of obtaining information concerning mutual funds might be lower as well. This would suggest lower costs of participating in the mutual fund industry for investors in more developed countries. At the mutual fund industry level, this would suggest that industries with higher participation costs will have greater flow-performance convexity.

In summary, investor sophistication and participation costs arguments suggest a less convex flow-performance relationship in more developed countries.[5] In our analysis below we choose to model their influence separately on the flow-performance relationship for two reasons. First, they capture different elements of fund trading decisions. Investor sophistication captures the ability of investors to process fund information while participation costs measure the informational and transactional costs of trading funds. Second investor sophistication is

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[5] An additional reason why development levels and convexity might be related is given to us by Berk and Green (2004). They argue that competitive equilibrium in the fund management industry is characterized by investors chasing winners and limited persistence in top fund performance. However, in transition to equilibrium before fund flows have reduced persistence, there will be greater performance persistence and winner chasing. This suggests that fund industries that are younger and further away from their long-run steady state will have investors that chase winners more intensely.

expected to influence the top and bottom of the flow-performance relationship while participation costs are likely to be more influential for the middle and the top. As a result it makes sense to model their impact on the way flows respond to past performance separately.

To examine these issues we use a large sample of equity mutual funds. The sample consists of more than 16,000 open-ended and actively managed equity funds in 28 countries over 2001-2007. We find that there are marked differences in the flow-performance relationship across countries, suggesting that U.S. findings to date do not apply directly to other countries.

We test the hypothesis that investors from more developed countries will show lower convexity in their flow-performance relationship due to their higher sophistication, the lower participation costs they face, and the greater maturity of their fund management industry. We find that measures of economic, financial market, and mutual fund industry development aimed at capturing these factors explain cross-country differences in convexity. Our findings support the view that development reduces convexity levels. We also show that our results are robust to other explanations of the flow-performance relationship such as taxes (Ivkovic and Weisbenner (2009)), market volatility and dispersion of fund manager ability (Kim (2010)).

We go on to demonstrate that differences in convexity across countries have implications for levels of fund manager risk taking. Specifically, we investigate whether fund managers respond to different levels of convexity in the flow-performance relationship in their countries. Chevalier and Ellison (1997) argue that greater flow sensitivity to performance is associated with greater fund manager risk taking as fund managers stand to gain significant flow if they do well but do not lose significantly if they perform poorly. We find that country-level convexity is positively and significantly associated with risk taking by fund managers.

We make several contributions to the mutual fund literature. We believe we are the first study on mutual fund flows to use a worldwide sample. While there are mutual fund cross-country studies covering topics such as industry size (Khorana, Servaes, and Tufano (2005)), fees (Khorana, Servaes, and Tufano (2009)), and performance (Ferreira, Miguel, and Ramos (2010)), there are no cross-country studies on mutual fund flows. Second, our worldwide sample of funds allows us to explore the role of economic, financial, and mutual fund industry development in shaping the flow-performance relationship around the world. Our results suggest that flow-performance convexity is likely to decline as countries develop in a manner consistent with the U.S. findings in Kim (2010).

Finally, we show how convexity differences across countries influence the levels of risk taking we observe. To the best of our knowledge, we are the first to relate country-level convexity to the degree of risk taking in fund management. This finding suggests that regulators and investors should exert greater effort in monitoring mutual funds in less developed countries, where mutual fund industries are less developed and participation costs are higher.

The paper is structured as follows. The next section describes the dataset and the variables constructed to enable cross-country comparison of the sensitivity of mutual fund flows to performance measures. Section 3 presents our results on the shape of the relationship between flows and performance, and in Section 4 we investigate the role of a country's development in influencing that relationship. In Section 5 we study the implications of the flow-performance relationship across countries for the risk taking behavior of fund managers. Section 6 reports the results of several robustness checks, and Section 7 concludes.

2. Data and Methodology

Our survivorship bias-free data on mutual fund sizes and returns are drawn from the Lipper Hindsight database. Lipper collects these data from fund management companies directly. Like Kacperczyk and Seru (2007) and others, we begin by eliminating multiple share classes to avoid double-counting funds and use the share class that Lipper identifies as the primary one.[6] Although multiple share classes are listed as separate funds in Lipper, they have the same holdings, the same manager, and the same returns before expenses and loads. The initial sample includes 37,910 primary equity funds (both active and dead funds) in the 2001-2007 period. It includes both domestic funds (funds that invest primarily in stocks of the country of domicile) and international funds (funds that invest primarily in stocks of countries different from the country of domicile). We restrict the sample to actively managed equity funds and exclude funds-of-funds, and closed-end, index tracking, and offshore funds which reduces the sample to 25,110 funds.[7]

We use aggregate statistics on mutual funds from the European Fund and Asset Management Association (EFAMA) and Investment Company Institute (ICI) to check the coverage of funds by Lipper. At the end of 2007, Lipper and EFAMA/ICI reported respectively, 26,800 and 26,950 equity funds. As of December 2007, EFAMA/ICI reported total net assets (TNA) of equity funds summed across all share classes of $12.5 trillion, while the Lipper Hindsight database reported a corresponding figure of $10.9 trillion. Thus, our initial sample of equity funds covers 87% of the total net assets of worldwide equity funds, despite some variation in coverage across

[6] The primary fund is typically the class with the highest total net assets (TNA). The primary class represents more than 80% on average of the total assets across all share classes.
[7] Offshore funds consist of funds registered for sale in offshore centers such as Luxembourg, Dublin, and the Cayman Islands.

countries and years. In some countries, including Canada, Germany, Sweden, the U.K., and the U.S., the coverage is above 90%, while the coverage in Australia and France is about 60% and in Japan only 40%.

We use quarterly data for fund sizes and monthly data for returns. A minimum of 24 monthly observations of fund returns are required for inclusion in the final sample. This is to ensure that we have sufficient observations to calculate risk-adjusted performance measures. To be able to draw meaningful conclusions from our analysis for different countries, we impose a minimum of ten funds per quarter in each country which leads to a final sample of 16,135 open-ended actively managed equity funds in 28 countries over 2001-2007. Table I presents the number and total net assets (TNA) of funds across countries at the end of 2007. TNA is given by the sum of all share classes (in $ million) when there are multiple share classes.

One can see considerable variation in the number of funds and fund TNA across countries in our sample. As of the end of 2007 there are 12,007 funds, representing a TNA of $6.7 trillion. The U.S. has the highest number of funds and the greatest amount of assets under management by far. U.S. funds represent 67% of the sample in terms of TNA but only 22% of the total number of funds. Australia and Canada have the second and third highest number of funds, each representing about 12% of the total number of funds in the sample. The U.K. and Canada have the second and third highest fractions of TNA, representing 8% and 6% of TNA, respectively. A country's weight in terms of number of funds is greater than its weight in terms of TNA for all countries except the U.S. Overall, the average U.S. fund is approximately seven times the size of the average non-U.S. fund.

2.1. Fund Flows

Following previous research, we define the the new money growth rate as the net growth in total net assets (TNA), not due to dividends and capital gains on the assets under management but to new external money.[8] Fund flow for fund *i* in country *c* at quarter *t* is calculated as:

$$Flow_{i,c,t} = \frac{TNA_{i,c,t} - TNA_{i,c,t-1}(1+R_{i,c,t})}{TNA_{i,c,t-1}}, \qquad (1)$$

where $TNA_{i,c,t}$ is the total net asset value in local currency of fund *i* in country *c* at the end of quarter *t*, and $R_{i,c,t}$ is fund *i*'s raw return from country *c* in quarter *t*. Equation (1) assumes flows occur at the end of each quarter, as we have no information regarding the timing of new investment.[9] To ensure that extreme values do not drive our results, we winsorize fund flows by country at the bottom and top 1% level of the distribution.

Table II presents descriptive statistics on flows measured as money growth rates by quarter for funds within each country and region during the sample period. Indonesia and Poland enjoy by far the highest average quarterly flows during the period, while South Korea has the lowest average quarterly outflows averaged across funds. The average money growth rate across the European countries in our sample is -0.16%; for Asian countries, the average quarterly fund growth rate is -3.03%. The U.S. enjoyed growth rates of 1.26% per quarter on average.

2.2. Performance Measurement

Mutual fund performance is measured using raw returns and risk-adjusted returns in local

[8] See, for example, Chevalier and Ellison (1997) and Sirri and Tufano (1998).

[9] Sirri and Tufano (1998) show that results are not sensitive to this assumption. Our results do not change whether flows are assumed to occur at the beginning or middle or continuously throughout the period.

currency. The calculation of total returns assumes that dividends are immediately reinvested. As in U.S. studies, our raw returns are gross of taxes and net of total expenses (annual fees and other expenses).

Risk-adjusted performance is calculated using two approaches: (1) Jensen's alpha, and (2) Four-factor alpha model using market, size, value, and momentum factors. Jensen's alpha is calculated in different ways for domestic and international funds. For domestic funds we first regress the previous 36 months of fund excess returns on the local (fund domicile) market excess returns, and store the estimated beta. We then use the estimated beta and the realized excess market return to predict the return of the fund in the next quarter. The quarterly alpha is the difference between the predicted return and the realized fund return.[10]

For international funds, we calculate alphas the same way except that we use the investment region market excess return factor in the regressions (calculated as the value-weighted average of market excess returns for all countries in the region in which the fund invests) and the rest of the world market return factor (calculated as the value-weighted average of market returns for all countries outside the region in which the fund invests). Like Bekaert, Hodrick, and Zhang (2009), to avoid the inclusion of a large number of country factors, we take a region-based rather than country-based approach to risk adjustment. The fund investment region is based on the Lipper geographic focus field, which can be a single country, a geographic region, or global. We map the geographic focus into four regions: Europe, Asia-Pacific, North America, Emerging Markets, and World.

[10] We use at least 24 monthly observations to estimate fund alphas if fewer than 36 monthly return observations are available. The risk-free rates of return are calculated using interbank middle rates for each country, with the exception of the U.S. for which we use U.S. T-bill rates from the U.S. Federal Reserve. Data on interbank middle rates are drawn from Datastream. Countries' market returns are proxied by Datastream country return indices.

We calculate four-factor alphas for domestic funds the same way we calculate Jensen's alpha, except that we use the domestic market, size, value, and momentum factors instead of a single market factor. For international funds, we calculate market, size, value, and momentum factors for each region. Size, value, and momentum factors are calculated as value-weighted averages of the corresponding factor for all countries in the region. The Appendix explains in detail how we calculate the four risk factors for each country in our dataset.

Panel A of Table III contains fund performance statistics by country. India, Hong Kong, and Indonesia turned in the highest average raw returns, and Italy, Germany, and France the lowest. The average Jensen's alphas and four-factor alphas in Table III provide us with a better understanding of the value of active management in each country. We can see that in Spain and Austria managers have most underperformed the market, while in Taiwan and Hong Kong managers have outperformed the most. The average one-factor alpha in our sample is -0.47% per quarter and the average four-factor alpha is -0.60%. Asia-Pacific countries, on average, performed better than the other regions according to the three measures of performance. We emphasize that the differences we observe in fund performance across countries are not due to survivorship-bias as our dataset includes dead funds as well. Overall, the fund performance figures here are consistent with evidence in other studies that find fund managers do not have the ability to beat the market after fees (e.g., Malkiel (1995) and Gruber (1996)).

It is informative to measure degrees of performance persistence by country. To examine this, we sort funds in each country into quintiles based on one-factor and four-factor alphas, and then we calculate the equally weighted return of the bottom and top quintiles over the next year. We then rebalance these portfolios each year. Using the generated time series of returns for the bottom and top quintiles, we regress these monthly returns on appropriate risk factors. The top and bottom fund quintile portfolios formed here for each country contain both domestic and international funds. We therefore calculate their one factor alpha using the market factor for the country concerned together with the markets factors for all the regions in which funds from that country invest. We do likewise for four factor alpha and use the domestic four factors plus the four factors of all the country-relevant regions to risk adjust performance.

The intercepts, representing monthly abnormal returns, generated for the bottom and top quintile regressions and their associated t-statistics are presented in Table IV. We see in the table that in most countries buying past winners does not result in abnormal returns measured using either one-factor alpha or four-factor alpha. Only in Denmark and Norway chasing winners result in significantly positive one-factor alpha abnormal performance, and it is only in Norway that it results in significantly positive four-factor abnormal performance. In 16 countries out of 28 using one-factor alpha and in 14 countries using four-factor alpha, we find statistically significant negative abnormal performance to buying past losers suggesting that selling past losers is generally advisable for countries in our dataset.

2.3. Control Variables

Researchers have documented that non-performance-related variables are also important in explaining flows and their sensitivity to performance, so we introduce a large number of non-performance-related fund attributes. Larger funds are expected to capture more money, and hence we include fund size as an explanatory variable (Chevalier and Ellison (1997), Sirri and Tufano (1998), and Barber, Odean, and Zheng (2005)). Most of these studies also use fund age to explain flows. We also use fund annual fees as a control variable, as many authors have shown that these fees explain fund flows, including Barber, Odean, and Zheng (2005), Huang, Wei, and Yan (2007), and Gil-Bazo and Ruiz-Verdú (2009). We also include front-end and back-end loads as control variables.

We include two additional control variables that are particular to this study. To capture the impact of geographic investment style, we introduce a dummy variable that equals zero if the fund is a domestic fund or one if the fund is an international fund. International funds are expected to offer wider investment diversification opportunities to their investors, and this may lead to higher flows. The other control variable is the number of countries where a fund is registered to sell. We include this variable to control for the possibility that an increase in the number of countries where a fund is sold may influence the flows that it attracts.

Panel A of Table III presents summary statistics of control variables by country averaged across fund quarters. As we would expect, funds in developed countries (particularly the U.S. and the U.K.) are the oldest and also the largest, on average. Fees are lowest in the U.S. and highest in Poland. Malaysia and Singapore charge the highest front-end loads and Canada and Portugal the highest back-end loads. Spain and South Korea have the lowest front-end loads, while Austria, Germany, Singapore, and South Korea are countries where funds tend not to charge back-end loads. Funds from India, Indonesia, and South Korea invest only in their own market in our dataset, while all funds from Ireland are international funds. Irish funds are registered to sell in by far the greatest number of countries. Funds in Canada, Italy, Japan, Poland, South-Korea, Taiwan, Thailand, and the U.S. sell generally only in their own country. The pairwise correlation matrix among fund control variables is presented in Panel B of Table III. Multicollinearity among these variables does not appear to be a serious concern as most correlation coefficients are low, suggesting that these variables may be included together in our flow-performance regressions.

3. The Flow-Performance Relationship

In this section we measure both convexity across all countries in our worldwide sample and the level of convexity at the individual country level. Our aim is to document how differently flows in each country respond to past performance.

3.1. Measuring Worldwide Convexity

First we measure the level of convexity across all countries in the sample. Our aim is to measure the relationship between favorable fund performance and flows and between poor fund performance and flows. We use a piecewise-linear specification in the manner of Sirri and Tufano (1998) and several others, which allows for different flow-performance sensitivities at different levels of performance. We allow slopes to differ for the lowest quintile, middle three quintiles, and the top quintile. The slopes are estimated separately for the bottom quintile (*Low*), the three middle quintiles (*Mid*), and the top quintile (*High*) of the fractional fund performance ranks.

In each quarter and for each country fractional fund performance, ranks ranging from zero (poorest performance) to one (best performance) are assigned to funds according to their past performance in the past year (measured by raw returns, one-factor alpha or four-factor alpha). The coefficients on these piecewise decompositions of fractional ranks represent the marginal fund-flow response to performance. This procedure assigns performance ranking variables for each of the three performance measures:

$$Low_{i,c,t-1} = \min(0.2, Rank_{i,c,t-1})$$

$$Mid_{i,c,t-1} = \min(0.6, Rank - Low_{i,c,t-1}) \qquad (2)$$

$$High_{i,c,t-1} = Rank - (Low_{i,c,t-1} + Mid_{i,c,t-1}).$$

We pool our data across countries and regress quarterly fund flows on piecewise past performance as well as control variables. We could use the Fama-Macbeth approach to run our regressions but we are prevented from doing so as we only have 28 countries in our dataset. We use weighted least squares, weighting each fund by the inverse of the number of funds in that country-quarter. This is to avoid giving excessive weight to countries in our sample that have a greater fraction of the number of funds, such as the U.S., and also to avoid giving greater weight to the latter part of the sample when there are more funds.[11] By comparing the slope of the flow-performance function in the *Low* region with the slope in the *High* region we can examine whether there is convexity in the flow-performance relationship in aggregate for all countries.

The regression results, with country and time fixed effects and standard errors adjusted for clustering by fund, are presented in Table V for the three different performance measures (raw returns, one-factor alpha, and four-factor alpha). To test for convexity, we conduct a Wald test to see whether there is a significant difference in the slope of the flow-performance function between the *Low* and the *High* regions.

Table V indicates that whatever performance measure we use and whatever specification we choose, there is statistically significant convexity in the flow-performance relationship for our

[11] We obtain similar findings using ordinary least squares as well.

worldwide sample of funds. The level of convexity is also economically significant. For example, using the *High* coefficient in column (9) of Table V, an improvement in performance ranking in a given quarter from the 80^{th} percentile to the 90^{th} percentile is associated with an increase in fund flows of 2.48% (= 0.248 x 0.1).

Regarding the coefficients of the control variables, we find that larger and older funds get less flow consistent with Chevalier and Ellison (1997) and Sirri and Tufano (1998). To control for autocorrelation in fund flows, we include lagged flows in columns (3), (6), and (9), and like Cashman, Deli, Nardari, and Villupuram (2007) we find that this enhances explanatory power. Interestingly, we find that international funds receive more money and that the number of countries that a fund is distributed in also enhances its flows.

3.2. Measuring Individual Country Convexity

We have found that the flow-performance relationship is non-linear for our worldwide sample of mutual funds when we do not allow for differential performance sensitivities by country. To examine whether there are differences in the way that investors from different countries respond to funds that do well and those that do poorly we do the following. For each country in the sample, we sort funds into quintiles each quarter on the basis of their raw return performance in the past year and we calculate the average fund flow by quintile.

Figure I plots average fund flow by performance quintile for each country in our dataset. The graphs show how fund performance ranks are related to percentage fund flow. As the range of fund flow is different across countries, we customize the scales for each country. Our graphs join together performance and flow data points relating to quintiles 1-2, 2-4, and 4-5, so that our graphs have three pieces and are therefore comparable with the previous U.S. literature which characterizes the flow-performance function by a bottom, middle, and top (e.g., Gruber (1996), Sirri and Tufano (1998), and Huang, Wei, and Yan (2007)).

The U.S. flow-performance relationship has been shown to be performance-sensitive at the bottom, flat in the middle, and the most sensitive at the top. If we examine the behavior of flows across performance quintiles, it is evident that most countries have three pieces in their relationship. Interestingly, however several countries have two pieces, including Austria, Hong Kong, Indonesia, Portugal, Spain, and the U.K. This preliminary evidence suggests that there are clear differences in the flow-performance relationship across countries.

We next estimate the flow-performance relationship for each individual country in the sample using weighted least squares regression. Specifically, we regress fund flows on piecewise past performance, but we now allow coefficients on past performance to vary by country. Regressions include the same control variables as in Table V, and we also allow coefficients on control variables to vary by country. We also include country fixed effects and time fixed effects and the standard errors are adjusted for clustering by fund. For brevity purposes, we limit our focus to *Low* (the flow-performance slope for the bottom quintile of funds) and *High* (the flow-performance slope for the top quintile of funds) past performance variables only.

Table VI presents the results. Panel A is divided into three parts depending on whether past performance is measured using raw returns, Jensen's alpha, or four-factor alpha. As the results are similar for the three measures of performance, we discuss only the four-factor alpha case here. The pairs of columns present the difference between *High* and *Low* coefficients for each country and the results of a Wald test used to determine whether the sensitivity of flow to past performance of a country is significantly different for *Low* and *High* performance levels.

There is a wide variation in convexity levels across countries, as is evident from the *High-Low* columns. There are eight countries in our sample with statistically significant convexity (plus the U.S.), and all these countries display greater convexity than the U.S. Our analysis highlights marked differences in the behavior of fund flows across countries and furthermore that fund flows in many countries do not behave like U.S. flows.

In Panel B of Table VI we present the difference between the sensitivity of fund flows to *Low* and *High* performance between a given country and the U.S. (using the U.S. as the base country) and the associated t-statistics of these differences in parentheses.

It is clear from looking at both fund flow sensitivities to top and bottom performance that there is considerable variation in the magnitude of these variables across countries, and that frequently these sensitivities differ from those of the U.S. in a statistically significant manner. In the case of sensitivity to poor performance, only two countries exhibit significantly greater sensitivity than the U.S., suggesting that U.S. investors are at the top of the scale when it comes to selling losers. In contrast, U.S. investors are at the middle of the country scale when it comes to chasing winners. Overall our results indicate that there are substantial variations in the flow-performance relationship across countries that we will explain in the next section.

4. Explaining the Flow-Performance Relationship across Countries

How much can we explain these flow-performance sensitivity differences across countries? We have noted that we expect differences in investor sophistication and participation costs across countries to manifest themselves in differences in flow-performance sensitivity. The literature that relates to the U.S. along with our Table IV suggest that not chasing winners but selling losers is a “sophisticated” thing to do as performance persists for poor performers but not for top performers. Accordingly, we expect investor sophistication to be negatively correlated with convexity. Additionally, the higher the costs of participating in the mutual fund industry are, the higher the rate of return a fund must earn before seeing a large number of investors switching into the fund (Huang, Wei, and Yan (2007)).[12] Thus, fund industries with higher participation costs are expected to exhibit a more convex flow-performance relationship at the upper end of the performance scale.

We therefore use two types of variables to explain convexity. The first type is based on proxies for investor sophistication, and the second type is based on proxies for participation costs. Variables in both categories are drawn from three indicators of development in a country, namely, economic development, financial development, and mutual fund industry development. As certain variables proxy for both investor sophistication and participation costs, we group variables according to the development characteristics**.**

We proxy for economic development using three variables: GDP per capita (GDPC); education measured as average number of years of education (averaged for men and women); and percentage of population that uses the internet. These variables are obtained from the World Development Indicators (WDI) database. We expect investor sophistication to increase with

[12] It is possible to translate these ideas from the fund level to the country level as follows. Suppose funds in country B have double the participation costs of funds in country A (individual funds in each country will naturally have participation costs distributed around this average). Funds in country B will have more convexity in their individual flow-performance relationships on average, and as the aggregate flow-performance relationship in each country is composed of the individual fund level flow-performance relationships, we would expect greater convexity in the aggregate flow-performance relationship for country B than country A.

economic development, and therefore to increase not only with a general proxy for development such as GDP per capita but also with specific indicators of development such as education and internet usage. Incidentally, internet usage could also proxy for participation costs as greater internet use is likely to lower the informational participation costs of investing in mutual funds.

We measure financial market development using two proxies for investor sophistication and a proxy for participation costs. To measure investor sophistication, we use a dummy variable that equals one if the country is considered an emerging market country (following MSCI Barra criteria), and stock market trading costs, as we expect these costs to be lower in more financially developed countries. Stock market trading costs are given by the annual average transaction cost in basis points (including commissions, fees, and price impact) from the Global Universe Data-ElkinsMcSherry database.

La Porta, Lopez-De-Silanes, Shleifer, and Vishny (1997) have shown that investor protection is a major determinant of a country's financial development. We use quality of the judicial system variable to measure the level of investor protection to capture participation costs faced by mutual fund investors. The quality of judicial system is measured as the sum of five variables from La Porta, Lopez-De-Silanes, Shleifer, and Vishny (1998): (1) efficiency of the judicial system; (2) rule of law; (3) corruption, (4) risk of expropriation; and (5) risk of contract repudiation.[13] We treat this investor protection variable as a measure of participation costs, as we would expect investors in environments with less protection to require quite high levels of performance to induce them to invest in financial instruments such as mutual funds. Khorana, Servaes, and Tufano (2005) show that mutual fund industries prosper in stronger legal environments, which is

[13] Each variable provides some unique information, but all are highly correlated. Khorana, Servaes, and Tufano (2005) use the sum of these five variables to avoid this correlation.

consistent with the idea that mutual fund investors are sensitive to the level of investor protection provided them. As this variable displays little variation across most countries, we use a dummy variable approach instead of using the raw variable itself. We set the dummy variable for judicial system equal to one if a particular country's judicial system offers greater investor protection than the median country.

We proxy for mutual fund industry development using the age of the mutual fund industry, the ratio of the size of the mutual fund industry (from ICI) relative to the size of the economy (as measured by GDP from WDI), and the average transaction costs incurred in buying and selling mutual funds. We expect investor sophistication to increase with the span of time that investors have had to invest in mutual funds and with the mutual fund industry size relative to the size of the economy. We gather data on the start year of the mutual fund industry in each country in our sample from Khorana, Servaes, and Tufano (2005) and use that to calculate fund industry age.

Transaction costs capture the effect of the costs of participating in the mutual fund industry (at the country level) on the observed flow sensitivity to performance. Huang, Wei, and Yan (2007) investigate whether transaction costs affect the flow-performance relationship by testing whether class C mutual fund shares display more convexity than other classes of mutual fund shares. Across the three main share classes, class C shares are viewed as having lower transaction costs (either buying or selling) because they have no front-end load (in contrast to class A shares) and have a short-lived back-end load (in contrast to class B shares). As share classes are likely to be different across countries, we take a more direct approach to measuring the costs of trading mutual fund shares at the country level by summing front and back-end loads by fund and then averaging these across funds within a country. Table VII presents average statistics of the development indicators that we use to explain flow-performance sensitivities by country.

Figure II graphs the potential of these variables to explain the relationship between flows and past performance. We sort our countries on the basis of each proxy for investor sophistication and participation costs. We then plot the flow-performance relationship for the top five and bottom five countries sorted by each of these variables.[14] Panel A is based on economic development, Panel B is based on financial market development, and Panel C is based on mutual fund industry development.

When our country variables proxy for investor sophistication, we expect countries with higher sophistication to be less sensitive to top performance and more sensitive to poor performance. For all the economic development variables and all the financial market and mutual fund industry development variables that proxy for investor sophistication, the flow-performance relationship is affected in exactly the way hypothesized.

When our country variables proxy for participation costs (transaction costs and judicial system quality), we expect countries with higher participation costs have higher convexity at the top of the flow-performance relationship. We do find that countries with higher participation costs in the form of higher mutual fund transaction costs have greater convexity at the top of their flow-performance relationship, confirming our predictions. This is due primarily to the effect of higher transaction costs on the slope of the high section of the flow-performance relationship. We also find some evidence that investor protection affects convexity due to its impact on the

[14] In the case of the emerging market dummy, our graph depicts the flow-performance relationship for all the emerging market countries taken together, and these are plotted alongside the corresponding relationship for all the non-emerging market countries taken together. In the case of the judicial system dummy, our graph depicts the flow-performance relationship for the top half and the bottom half of countries ranked by this variable.

middle section of the flow-performance relationship.

To estimate the contribution of these country-level variables to flow-performance sensitivity more precisely while controlling for the determinants of fund flows, we regress flows for all funds on piecewise lagged performance and piecewise lagged performance interacted with the proxies for investor sophistication and participation costs. We use weighted least squares, weighting each fund observation by the inverse of the number of funds in each country-quarter as before. Regressions also include the same set of control variables (for brevity coefficients are omitted from the table).

In each regression we also separately include the country-level variables that we are using to explain flow-performance sensitivity. This is to ensure that our estimates of the role of these variables in determining flow sensitivity are not driven by their contribution to the level of flows in the country concerned. Tables VIII-X present the results of the regressions using proxies for economic development, financial market development, and mutual fund industry development to explain flow-performance sensitivity.

We use GDP per capita and level of education to capture investor sophistication. Results in Table VIII show that investors chase winners less intensely in countries with higher GDP per capita and higher education. GDP per capita also increases the sensitivity of fund flows to poor performance. Interestingly, internet usage reduces the sensitivity of flows to high performance and increases the sensitivity to middle-range performance, but does not make a significant contribution to the flow-performance relationship in the low range. The internet usage variable thus behaves more like a proxy for investor participation costs than a proxy for investor sophistication.

Table IX provides the regression results for financial market development variables. With a stronger judicial system, participation costs fall, which should increase the slope of the middle section and reduce the slope of the high section of the flow-performance relationship of countries. The results for this variable are consistent with our expectations. Emerging market dummy and trading costs proxy for investor sophistication, and hence should affect the sensitivity of flow to low and high performance. When we look at whether these variables influence convexity, they do so but only via their impact on the sensitivity of fund flows to high performance.

Table X presents the results for the mutual fund industry development variables. Our hypothesis is that the more developed the fund industry in country, the more financially sophisticated its mutual fund investors are, and the lower the level of participation costs they face.

We begin by considering the two variables that measure investor sophistication. When we look at mutual fund industry age, we find robust evidence that investors in countries with older mutual fund industries buy winners less readily, but mutual fund industry age has no significant effect on sensitivity to poor performance. The mutual fund industry size relative to the size of the economy variable affects the sensitivity to poor performance but does not affect the sensitivity to top performance. We find that investors from countries with larger mutual fund sectors (relative to the size of their economy) sell losers much more vigorously, but we find little evidence that they chase winners less.

Table X also presents the results for mutual fund transaction costs, with the aim of measuring participation costs. As these costs affect the top of the flow-performance relationship alone, our focus is on its impact on the slopes of the middle and high sections of the flow-performance relationship. As conjectured, we do find evidence that the costs of buying and selling funds reduce sensitivity to mid-range performance and increase sensitivity to top performance.

Overall, the shape of the flow-performance relationship around the world does appear to be determined by levels of investor sophistication and participation costs. The flow-performance relationship is more convex in countries with less sophisticated investors and where investors face higher costs of participating in the mutual fund industry.

To measure the economic significance of our results we look at India, a developing country with a large number of funds. We examine the impact on Indian convexity of bringing the level of sophistication and participation costs of Indian investors to U.S. levels. To do this, we raise the level of Indian measures of development to the U.S. levels of these variables; the results are presented in Table XI.

As an example, let us consider the case of one particular proxy for investor sophistication, namely GDP per capita. Indian average GDP per capita in Table VII is $3,499. We raise this to the U.S. GDP per capita level given in the same table of $40,144. We then calculate the impact of this on the *Low* flow-performance sensitivity of India (using alpha as the performance measure) by multiplying the change in the log of GDP per capita with the interaction coefficient between log GDP per capita and *Low*. We do the same for *High*, and use these two estimates to calculate the effect of raising Indian GDP per capita to U.S. levels on Indian convexity. In this case, Indian's convexity changes from 1.586 (see *High-Low* in Panel A of Table VI) to 0.444, which represents an economically substantial reduction in convexity of 72%.

We also calculate the impact on Indian convexity of changing other Indian development proxies to U.S. levels. Altering education or internet usage (assuming internet usage proxies for investor sophistication) to U.S. levels results in a reduction in convexity of a substantial 46% and 69%, respectively. Making India a non-emerging market country reduces its convexity by 33%, and changing its trading costs to U.S. levels reduces its convexity by 27%. Raising the Indian judicial system to U.S. levels also leads to a reduction in Indian convexity of 18%.

These are all sizeable changes in convexity. Less marked are the impacts of mutual fund industry age, fund industry size relative to GDP, or fund transaction costs. Overall, it is clear that investor sophistication and participation costs can have a considerable impact on observed convexity levels around the world.

5. Implications of the Flow-Performance Relationship across Countries

One might ask whether fund managers respond to different levels of convexity in the flow-performance relationship in their countries. Chevalier and Ellison (1997) show that U.S. fund managers toward the end of a performance evaluation period have an incentive to take additional risk if there is a chance that by doing so they will get to the top of the performance scale. According to their hypothesis, intra-year fund-level risk shifting is affected by the past performance and the level of convexity that the fund faces. As we have access to only monthly fund return data, it would be noisy to estimate measures of intra-year risk shifting. What we do examine is whether the general level of risk taking is influenced by the level of convexity in a country.

To test this idea we relate tracking error, a proxy for the level of risk taking by managers of mutual funds, to a lagged measure of country-level convexity. We expect higher fund tracking error in countries with more convex flow-performance relationships, as fund managers in these countries have more incentive to deviate from the behavior of their peer group in an attempt to ascend the performance scale.

Tracking error is measured as the annualized standard deviation of the difference between the return on a given fund and the domestic market index return over a 12-month window. If the fund is an international fund, we use as a benchmark the value-weighted return on all countries in the fund investment region. To maximize the number of observations available, we measure tracking error using a 12 months window and roll this window forward one quarter at a time.

We test whether tracking error is related to country-level convexity, measured as the difference between high and low coefficients from our usual piece-wise linear regression of country-level flows lagged performance over the previous four quarters. Like Chevalier and Ellison (1997), we include as control variables the lagged value of tracking error to allow for mean reversion in manager risk taking; lagged fund size; and also convexity interacted with lagged fund size. Chevalier and Ellison (1997) use the latter variable to recognize that it may be more difficult for larger funds to change the riskiness of their portfolios. In some specifications, we also include fund age in the same manner as fund size, recognizing that younger funds with less established track records stand to gain more by risk taking. Both Chevalier and Ellison (1997) and Huang, Sialm, and Zhang (2010) find that younger funds engage in more risk taking behavior. Our risk-taking regressions also include time fixed effects to capture time variation in risk taking unexplained by our control variables. We use Newey-West adjusted t-statistics to correct for overlapping observations.

Panel A of Table XII presents the results of the fund tracking error regressions using all three measures of fund performance to estimate country-level convexity. The first two specifications for these regressions use alternately fund size and age as explanatory variables. The third specification uses both. As expected, larger and older funds take less risk and respond less to changes in convexity. More importantly, it is clear that there is robust evidence across specifications that convexity increases risk taking in a statistically significant way. To illustrate our results, in keeping with Table XI, we measure the impact on average fund manager tracking error in the U.S. of an increase in convexity from the level in the U.S. to the level in India (using convexity measured using the difference between *High* and *Low* coefficients and four-factor alphas). Moving from the U.S. to India increases convexity from 0.073 to 1.586 (see Panel A of Table), which translates to an increase in average annualized U.S. mutual fund manager tracking error by 10 percentage points using the estimates in column (9) in Panel B of Table XII. Hence the impact of convexity on risk taking is not only statistically but is also economically significant. This effect holds using as a risk measure the standard deviation of fund returns as well.

We conclude that the level of convexity in the flow-performance relationship has implications in terms of the incentives for fund managers to take risk. Fund managers take more risk in countries with higher levels of convexity, which suggests that regulators and investors should monitor the behavior of fund managers in these countries more closely.

6. Robustness

Ivkovic and Weisbenner (2009) highlight the importance of capital gains taxes in influencing the outflow-performance relationship in the U.S. We examine whether differences in capital gains taxes for mutual fund investors are responsible for our results. We gather data on capital gains taxes from the Organization for Economic Cooperation and Development (OECD) tax statistics database. We then re-run our main tests in Tables VIII-X including not only our development variables interacted with fund performance but also mutual fund capital gains taxes rates in each country interacted with *Low*, *Mid*, and *High* range performance measures. Our results remain largely unchanged.

Recent work by Kim (2010) relates convexity in U.S. mutual funds to market volatility and the dispersion of managerial ability. We examine whether the variables in this study are responsible for our results. To this end, we re-run our analysis in Tables VIII-X including two additional variables namely, the interaction of past performance (*Low*, *Mid* and *High*) with lagged market volatility and the interaction of past performance with a proxy for the dispersion of managerial ability in the country concerned. Market volatility is calculated using monthly market returns for domestic funds and using the investment region market returns for international funds over the prior 12 months. The dispersion of managerial ability is measured (using a similar approach to Kim) as the residual from a regression of the cross sectional standard deviation of fund returns (over 12 months across funds in each country) on the mean and standard deviation of the market index return in the case of domestic funds and the mean and standard deviation of the relevant investment region market for international funds. We find that the impact of using these additional variables has little bearing on our results.

We conduct a number of further tests to examine the robustness of our results. First, we examine the impact of using a different measure of fund flows. Our initial tests work with raw fund flow scaled by fund size. However, it is clear from Table II, that countries have very different average money growth rates and very different volatilities in money growth rates across funds, which might inhibit our ability to compare flow-performance sensitivities. To test whether controlling for differences in the mean and volatility of money growth rates makes a difference in our results, we try two normalized measures of our flow variable. The first is simply a mean-adjusted version of our raw measure, where we subtract from our initial flow variable, the average new money growth rate in the same country-quarter. The second is a mean-adjusted version of the raw measure scaled by the standard deviation of money growth rates across funds calculated using fund flows in the same country-quarter. Whichever normalization procedure we use, our results are little affected.

Second, we address the concern raised by the fact that certain countries' fund flows do not always increase with fund performance (see Figure I). This may be because in these countries, at certain times, non-performance variables are dominant in explaining fund flows. To investigate whether these observations are influential, we drop country-years with negative flow-performance sensitivities and rerun the tests. This has little effect on the results.

Third, we investigate whether using alternative performance measures makes a difference in the results. To check this possibility, we measure fund performance using Sharpe ratios and benchmark-adjusted returns. The benchmark adjusted returns are obtained from Lipper.[15] We find that using either of these performance measures has little impact on our findings.

Fourth, we drop the U.S. from the sample to see whether our findings are driven by the large number of U.S. funds in the dataset. When we repeat the analysis excluding the U.S., our results remain largely unchanged. Finally, we test whether our results hold separately for domestic and international funds. We find the results are robust in both samples.

[15] Lipper determines the benchmark of a fund from either the fund prospectus or directly from the fund manager.

7. Conclusion

Our understanding of what drives the buying and selling decisions of mutual fund investors is based primarily on the behavior of U.S. investors. To fill this gap in the literature we use data on a large sample of equity mutual funds in 28 countries. We show that there are substantial differences in flow-performance relationship across countries, meaning that U.S. findings do not map directly onto other countries.

We hypothesize that investor sophistication and participation costs, proxied by economic, financial, and mutual fund industry development variables, explain the cross-country differences in the flow-performance relationship that we observe. Investor sophistication and participation costs capture different elements of fund trading decisions and they have different implications for the flow-performance relationship. When we compare how investors react to top performance in more developed countries and less developed countries, we find that reactions are more restrained in more developed countries. When it comes to selling losers, however, investors in more developed countries are generally more pro-active than elsewhere. Our findings support the view that the more sophisticated investors are and the lower participation costs they face, the less convex the flow-performance convexity we observe.

Understanding how fund flow convexity is likely to evolve across time as countries develop is difficult because of the short time span of data typically available and because the variables that explain convexity are slow-moving. It is an advantage to use a sample of countries which are at very different stages of development to show how convexity relates to different dimensions of development. We thus shed light on the likely evolution of convexity in a given country, which would be difficult to ascertain if we were working with a single country in time series.

We also demonstrate that there are important implications of the convexity of the flow-performance relationship for the risk-taking behavior of mutual fund managers. One would expect managers faced with greater flow-performance convexity to take more risk, as they have more to gain if they perform well and less to lose if they perform poorly. Our evidence shows that managers in countries with more convex flow-performance relationships take more risk, as measured by tracking error. This suggests that in less developed countries, which usually have less developed mutual fund industries, investors and regulators should pay particular attention to fund manager actions.

Appendix – Calculation of Factors for Risk Adjustment of Fund Performance

We construct the monthly benchmark factors for each individual country except the U.S. using all stocks included in the Datastream/Worldscope database. For the U.S. we use the factors constructed by Fama and French.[16] The local market return is computed using the value-weighted average return in local currency of all stocks in each country in each month. The investment region market factor is computed using the value-weighted average return of all countries' market returns in the region. The regions are Europe, Asia-Pacific, North America, Emerging Markets, and World.

To form the size and book-to-market equity portfolios, we follow the procedure described in Fama and French (1992). For each country, we calculate the small-minus-big (SMB) and high-minus-low (HML) factors from July of year *t* through June of year $t + 1$ using six value-weighted portfolios formed at the end of June of year *t* on the intersection of two size portfolios (market equity capitalization, ME) and three book-to-market equity (BE/ME) portfolios. The size breakpoint is the median market capitalization of each country as of the end of June of year *t*. Half of the firms are classified as small market capitalization and the other half as big market capitalization. For the BE/ME classification, the breakpoints are the 30th and 70th percentiles of BE/ME in each country for the fiscal year end in $t - 1$. The bottom 30% are designated as the value portfolio, the middle 40% as neutral, and the highest 30% as growth.

The SMB factor is the monthly average return of the three small portfolios minus the average return of the three big portfolios:

SMB = (Small Value + Small Neutral + Small Growth - Big Value - Big Neutral - Big Growth)

[16] The U.S. factors are drawn from French's website: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/

The investment region SMB is the monthly value-weighted average of all countries' SMB factors in the region.

The HML factor is the monthly average return of the two value portfolios minus the monthly average return of the two growth portfolios:

HML = (Small Value + Big Value - Small Growth - Big Growth)/2

The investment region HML factor is the monthly value-weighted average of all countries' HML factors in the region.

The momentum factor (MOM) for month t is calculated using six value-weighted portfolios formed at the end of month *t - 1*, as a result of the intersections of two portfolios formed on size (ME) and three portfolios formed on prior (2-12) month returns. The ME breakpoint is the median market equity in each country as of the end of month *t - 1*. For the return classification, the 30th and 70th percentiles of the prior returns (2-12) in each country are the breakpoints. The bottom 30% are designated as the down-month prior return portfolio, the middle 40% as medium, and the highest 30% as up. The MOM factor is the monthly average return in local currency on the two high-prior return portfolios minus the monthly average return on the two low-prior return portfolios:

MOM = (Small High + Big High - Small Low - Big Low)/2

The investment region MOM factor is the monthly value-weighted average of all countries' MOM factors in the region.

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Table I – Number, Total Net Assets and Average Size of Mutual Funds by Country

This table presents the number of funds, the Total Net Assets (sum of all share classes in millions of U.S. dollars) and the average fund size by country at the end of 2007. The sample is restricted to open-end and actively managed equity funds. Off-shore funds are excluded. A minimum of 24 continuous monthly observations for returns per fund and a minimum of 10 funds per quarter in each country are required for inclusion in our sample.

Country	Number of funds	TNA ($ million)	Size ($ million)
Australia	1,477	178,495	121
Austria	260	24,164	93
Belgium	197	29,326	149
Canada	1,472	419,754	285
Denmark	183	35,991	197
Finland	138	21,585	156
France	1,099	263,602	240
Germany	409	152,527	373
Hong Kong	28	5,213	186
India	112	22,869	204
Indonesia	18	2,498	139
Ireland	80	21,229	265
Italy	289	76,634	265
Japan	613	52,648	86
Malaysia	138	5,626	41
Netherlands	166	65,775	396
Norway	150	31,283	209
Poland	23	10,674	464
Portugal	54	4,535	84
Singapore	195	15,299	78
South Korea	147	17,935	122
Spain	406	32,122	79
Sweden	241	108,866	452
Switzerland	169	41,014	243
Taiwan	209	15,293	73
Thailand	96	1,641	17
U.K.	1,009	536,400	532
U.S.	2,629	4,508,814	1,715
All Countries	12,007	6,701,814	558

Table II – Descriptive Statistics of Fund Flows by Country

This table presents mean, standard deviation, percentiles of quarterly money growth rates in percentage across funds within each country from 2001 to 2007. Flows are winsorized by country at the 1th and 99th percentiles. N is the number of fund-quarter observations.

		Standard	Percentiles					
Country	Mean	deviation	10th	25th	50th	75th	90th	N
Australia	1.48	15.44	-10.44	-5.24	-0.84	4.59	15.11	3,417
Austria	-0.53	13.82	-11.12	-5.09	-1.20	1.78	9.35	4,715
Belgium	-1.56	13.74	-12.31	-5.93	-2.21	0.99	9.24	4,435
Canada	-0.23	11.33	-9.03	-5.14	-1.79	2.28	9.26	14,227
Denmark	6.04	45.72	-9.55	-4.67	-0.59	4.53	16.19	3,125
Finland	2.49	18.25	-11.25	-4.97	-0.41	4.73	17.15	2,141
France	0.47	14.99	-11.20	-4.49	-0.66	2.89	12.10	24,458
Germany	-2.38	12.28	-12.10	-6.19	-2.15	0.86	6.51	9,758
Hong Kong	4.72	14.73	-5.64	-1.12	1.74	9.41	24.30	58
India	2.75	44.73	-23.77	-11.13	-3.54	6.22	32.98	1,769
Indonesia	17.46	59.40	-28.85	-10.96	0.19	26.90	73.66	213
Ireland	1.25	22.37	-15.64	-6.51	-0.94	3.95	15.38	991
Italy	-2.66	12.95	-13.42	-8.18	-4.03	0.43	8.11	8,171
Japan	-3.74	9.97	-12.33	-6.80	-3.29	-0.57	3.93	13,753
Malaysia	-2.71	11.85	-15.20	-7.42	-1.95	1.18	7.96	2,254
Netherlands	-0.47	9.44	-8.10	-4.27	-1.12	1.63	6.23	3,032
Norway	0.01	18.72	-12.74	-6.13	-2.13	2.20	13.20	3,170
Poland	15.98	41.00	-13.53	-2.99	6.58	18.27	49.80	396
Portugal	1.00	14.45	-10.87	-5.04	-1.30	4.38	17.12	914
Singapore	-1.16	13.67	-11.90	-6.93	-2.57	1.56	11.28	4,201
South Korea	-12.48	21.92	-40.94	-24.44	-8.74	-0.56	6.65	4,432
Spain	0.15	18.61	-13.39	-7.11	-2.34	2.40	14.89	8,445
Sweden	1.22	11.36	-7.28	-2.79	-0.40	3.17	11.13	5,235
Switzerland	-2.19	11.52	-11.92	-5.91	-2.43	1.33	7.97	3,814
Taiwan	6.37	38.88	-16.97	-10.03	-3.68	6.41	34.31	1,261
Thailand	-2.71	10.40	-10.59	-4.37	-1.73	-0.30	1.80	1,761
U.K.	-0.21	14.73	-9.18	-3.81	-1.03	2.07	9.28	16,480
U.S.	1.26	14.64	-9.27	-4.68	-1.10	3.68	13.25	66,725
All Countries	-0.17	16.37	-11.27	-5.45	-1.56	2.41	11.17	213,351

Table III – Fund Variables

Panel A presents fund level variables averaged across fund quarters by country for the period 2001-2007. Panel B presents pairwise correlations among these variables. Performance measures include: the average raw returns in the past four quarters; one-factor alpha and four-factor alpha both calculated based on average alpha in the past four quarters. Control variables include: fund size, measured by fund's TNA in millions of U.S. dollars at the end of each quarter (*Size*); fund age in years at the end of each quarter (*Age*); percentage annual fee (*Fees*); percentage front-end load (*Front-end loads*); percentage rear load (*Back-end loads*); geographic investment style dummy variable (*Geographic dummy*), that equals zero if the fund is a domestic fund or one if the fund is an international fund; and number of countries where a fund is registered to sell (*Number of countries sold*).

Panel A - Average of Fund Variables by Country

Country	Raw returns (%)	One-factor alpha (%)	Four-factor alpha (%)	Size ($ million)	Age (years)	Fees (%)	Front-end loads (%)	Back-end loads (%)	Geographic dummy	Number of countries sold
Australia	4.22	-0.96	-0.51	138	6.52	1.46	2.07	0.06	0.46	1.03
Austria	2.00	-1.48	-1.48	47	7.33	1.52	4.53	0.00	0.96	1.99
Belgium	1.40	-1.22	-0.96	102	7.44	1.08	2.62	0.02	0.88	3.77
Canada	3.15	-1.34	-1.16	186	9.16	1.49	1.87	3.04	0.65	1.00
Denmark	2.90	-0.75	-0.70	104	9.64	1.35	2.12	0.69	0.88	1.80
Finland	3.17	-0.38	-0.04	110	6.78	1.51	1.14	0.94	0.79	1.46
France	0.97	-1.22	-1.36	137	10.76	1.63	2.94	0.24	0.73	1.14
Germany	0.75	-1.38	-1.30	292	11.84	1.33	4.38	0.00	0.83	1.92
Hong Kong	8.60	2.09	1.78	149	7.55	1.08	3.40	0.25	0.83	1.36
India	9.75	1.38	0.84	44	6.85	1.24	2.12	0.60	0.00	1.44
Indonesia	8.29	0.35	0.13	47	8.06	1.76	1.33	1.67	0.00	1.06
Ireland	3.11	-1.32	-1.36	162	5.60	1.19	4.55	0.36	1.00	6.20
Italy	0.65	-1.43	-1.33	262	8.61	1.92	2.45	0.78	0.82	1.00
Japan	1.87	0.40	0.38	64	8.13	1.43	2.24	0.12	0.34	1.00
Malaysia	2.60	-0.59	-0.41	43	10.11	1.56	6.23	0.18	0.01	1.06
Netherlands	1.49	-1.27	-1.15	335	10.01	1.17	1.15	0.60	0.85	1.25
Norway	3.40	-1.22	-1.74	106	8.67	1.61	2.53	0.48	0.63	1.34
Poland	5.04	0.51	-0.43	157	6.10	3.58	4.04	0.59	0.24	1.00
Portugal	2.58	-0.88	1.28	52	7.67	1.90	0.26	1.98	0.67	1.11
Singapore	2.89	-0.26	0.31	38	7.36	1.19	4.69	0.00	0.94	1.12
South Korea	4.89	0.85	1.03	19	5.26	2.70	0.04	0.00	0.00	1.00
Spain	1.48	-1.68	-1.66	65	7.23	1.94	0.00	0.92	0.78	1.02
Sweden	1.93	-0.80	-0.83	278	10.70	1.38	0.26	0.37	0.59	1.19
Switzerland	1.58	-0.39	-0.49	197	14.03	1.47	4.17	0.71	0.72	2.01
Taiwan	6.70	2.30	2.58	57	8.69	1.59	1.96	0.77	0.24	1.00
Thailand	5.11	0.79	0.26	10	9.01	1.39	0.78	0.45	0.01	1.00
U.K.	1.45	-0.90	-0.74	348	14.93	1.38	4.29	0.01	0.63	2.03
U.S.	1.95	0.36	-0.20	952	12.63	0.71	1.78	0.78	0.20	1.05
All Countries	2.07	-0.47	-0.60	403	10.61	1.29	2.38	0.64	0.51	1.31

Panel B - Pairwise Correlations among Fund Variables

		1	2	3	4	5	6	7
Log size	1	1						
Log age	2	0.40	1					
Fees	3	-0.25	-0.14	1				
Front-end loads	4	0.02	0.07	0.10	1			
Back-end loads	5	0.02	-0.02	0.18	0.00	1		
Geographic dummy	6	-0.09	-0.13	0.22	0.14	0.04	1	
Number of countries sold	7	0.11	0.06	0.05	0.18	-0.09	0.17	1

Table IV– Performance Persistence by Country

This table presents absolute performance persistence statistics by country. We first sort funds in each country into quintiles based on one-factor alpha and then we calculate the equally weighted return of the bottom and top quintiles over the next year. We then rebalance these portfolios each year. Using the generated time series of returns for the bottom and top quintiles, we regress these monthly returns on the appropriate risk factors. In the case of one factor alpha we use the market factor for the country concerned together with the markets factors for all the regions in which funds from that country invest. In the case of four factor alpha we use the domestic four factors plus the four factors of all the country-relevant regions. The intercepts generated for the bottom and top quintile regressions and their associated t-statistics are presented. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

	One-factor alpha				Four-factor alpha			
	Bottom quintile		Top quintile		Bottom quintile		Top quintile	
Country	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
Australia	-0.172	-0.38	-0.930**	-2.13	-1.113**	-2.05	-2.062***	-3.70
Austria	-1.052***	-3.93	-0.258	-0.99	-0.938***	-3.53	-0.357	-1.19
Belgium	-0.792***	-4.16	0.043	0.22	-0.686***	-3.25	-0.024	-0.11
Canada	-0.488	-1.24	-0.446	-1.29	-0.654	-1.55	-0.488	-1.53
Denmark	-0.697***	-3.29	0.232	0.79	-0.609***	-2.76	0.167	0.46
Finland	-0.673***	-2.96	0.105	0.36	-0.575**	-2.42	0.156	0.41
France	-0.945***	-4.89	-0.208	-1.10	-1.023***	-4.76	-0.358*	-1.76
Germany	-0.976***	-5.32	-0.356**	-2.48	-0.810***	-4.03	-0.325**	-2.30
Hong Kong	0.024	0.07	-0.278	-0.64	0.082	0.23	-0.014	-0.03
India	0.071	0.09	0.754	0.80	0.121	0.13	0.791	0.76
Indonesia	-0.512	-0.53	0.797	1.07	-1.083	-1.19	0.324	0.40
Ireland	-0.689***	-3.01	-0.049	-0.19	-0.705***	-2.90	0.062	0.19
Italy	-0.840***	-6.54	-0.280	-1.59	-0.713***	-5.01	-0.124	-0.60
Japan	-0.512**	-2.32	0.357	1.21	-0.542***	-2.73	0.432	1.33
Malaysia	0.493	0.77	1.163	1.17	-0.316	-0.23	0.666	0.32
Netherlands	-0.827***	-3.50	-0.043	-0.18	-0.767***	-3.15	-0.125	-0.44
Norway	-0.352	-1.27	0.366	1.11	-0.387	-1.32	0.204	0.64
Poland	0.482	0.93	0.720	0.66	0.634	0.58	0.638	0.28
Portugal	-0.697***	-3.26	0.149	0.43	-0.225	-0.66	0.024	0.06
Singapore	-0.328*	-1.69	0.075	0.29	-0.301	-1.57	-0.210	-0.79
South Korea	-0.696	-1.23	-0.571	-1.13	-1.118*	-1.93	-1.029*	-1.94
Spain	-0.718***	-4.62	-0.164	-0.80	-0.663***	-3.47	-0.177	-0.88
Sweden	-0.820***	-2.83	0.058	0.25	-0.768***	-2.92	0.003	0.01
Switzerland	-0.479**	-2.26	0.035	0.14	-0.592**	-2.54	-0.182	-0.70
Taiwan	-0.114	-0.25	-0.236	-0.54	0.113	0.24	0.037	1.46
Thailand	-0.679	-0.72	-0.339	-0.33	0.420	0.35	1.878	1.46
U.K.	-0.757***	-3.11	-0.275*	-1.66	-0.826***	-2.80	-0.335*	-1.66
U.S.	-0.159	-1.21	0.228	1.09	-0.220**	-2.11	-0.190	-1.64

Table V – The Flow-Performance Relationship across all Countries

This table presents the results of panel regressions examining the aggregate flow-performance relationship with funds pooled across 28 countries. Weighted least squares is used where each fund is weighted by the inverse of the number of funds in each country-quarter. The dependent variable is fund *flows* and the independent variables are past performance and control variables. A piecewise linear regression is used to define three linear segments in the flow-performance relationship. In each quarter, by country, fractional performance ranks ranging from zero to one are assigned to funds according to their average raw returns in the past four quarters, their one-factor alpha and their four-factor alpha. This procedure designates three performance variables: $Low_{i,c,t-1}=min(0.2,Rank_{i,c,t-1})$, $Mid_{i,c,t-1}=min(0.6,Rank-Low_{i,c,t-1})$, and $High_{i,c,t-1}=Rank-(Low_{i,c,t-1}+Mid_{i,c,t-1})$. Refer to equation (2) for variable definitions. Control variables include: fund size, measured by the natural log of fund's TNA in U.S dollars lagged by one quarter ($Log\ size_{t-1}$); the natural log of fund age lagged by one quarter ($Log\ age_{t-1}$); annual fee lagged by one quarter ($Fees_{t-1}$); front-end load lagged by one quarter ($Front\text{-}end\ loads_{t-1}$); rear load lagged by one quarter ($Back\text{-}end\ loads_{t-1}$); flow lagged by one quarter ($Flow_{t-1}$); geographic investment style dummy variable (*Geographic dummy*), that equals zero if the fund is a domestic fund or one if the fund is a foreign fund; and the number of countries where fund is registered to sell (*Number of countries sold*). Robust t-statistics clustered by fund are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. p-values from a Wald test of the equality of top and bottom performance quintile coefficients for each regression specification are reported in the last row of the table.

	Raw returns			One-factor alpha			Four-factor alpha		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Low t-1	0.038	0.062**	0.053**	0.086***	0.122***	0.111***	0.076***	0.088***	0.083***
	(1.39)	(2.39)	(2.14)	(3.32)	(4.95)	(4.88)	(2.80)	(3.23)	(3.32)
Mid t-1	0.057***	0.068***	0.062***	0.041***	0.048***	0.044***	0.038***	0.047***	0.042***
	(7.92)	(8.81)	(8.54)	(5.59)	(6.13)	(6.13)	(5.18)	(5.93)	(5.73)
High t-1	0.317***	0.305***	0.253***	0.362***	0.356***	0.300***	0.300***	0.296***	0.248***
	(7.06)	(6.36)	(6.30)	(7.04)	(6.52)	(6.29)	(5.84)	(5.32)	(5.19)
Log Size t-1		-0.007***	-0.008***		-0.007***	-0.008***		-0.006***	-0.008***
		(-5.28)	(-6.77)		(-5.02)	(-6.57)		(-4.65)	(-6.28)
Log Age t-1		-0.012***	-0.008***		-0.011***	-0.007***		-0.011***	-0.008***
		(-5.32)	(-4.08)		(-4.89)	(-3.70)		(-4.91)	(-3.70)
Fees t-1		-0.005	-0.004		-0.003	-0.003		-0.002	-0.002
		(-1.42)	(-1.40)		(-0.98)	(-0.96)		(-0.76)	(-0.74)
Front-end loads t-1		-0.001	-0.001		-0.001	-0.001		-0.001	-0.001
		(-0.80)	(-0.90)		(-0.82)	(-0.92)		(-0.70)	(-0.80)
Back-end loads t-1		0.006*	0.005*		0.006*	0.005*		0.006*	0.005*
		(1.67)	(1.73)		(1.70)	(1.76)		(1.68)	(1.75)
Number of countries sold		0.005***	0.004***		0.005***	0.005***		0.005***	0.005***
		(4.37)	(4.70)		(4.73)	(5.11)		(4.89)	(5.29)
Geographic dummy		0.012***	0.010***		0.011***	0.009***		0.010***	0.008***
		(4.36)	(4.16)		(3.80)	(3.61)		(3.40)	(3.17)
Flows t-1			0.129***			0.129***			0.133***
			(9.18)			(9.09)			(9.38)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.067	0.077	0.092	0.067	0.077	0.092	0.063	0.073	0.089
Number of observations	213,351	213,351	213,351	213,351	213,351	213,351	213,351	213,351	213,351
Wald test High=Low (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001

Table VI – The Flow-Performance Relationship by Country

This table presents the results from panel regressions examining the flow-performance relationship across 28 countries worldwide. Weighted least squares is used where each fund is weighted by the inverse of the number of funds in each country-quarter. A piecewise linear regression is used to define three linear segments in the flow-performance relationship. In each quarter, by country, fractional performance ranks ranging from zero to one is assigned to funds according to their average raw returns in the past four quarters, one-factor alpha and four-factor alpha. This procedure designates three performance variables: $Low_{i,c,t-1}=min(0.2,Rank_{i,c,t-1})$, $Mid_{i,c,t-1}=min(0.6,Rank-Low_{i,c,t-1})$, and $High_{i,c,t-1}=Rank-(Low_{i,c,t-1}+Mid_{i,c,t-1})$. Control variables are the same as in Table 5. Panel A presents the difference between *High* and *Low* coefficients by country and the p-value of a Wald test of whether this difference is statistically significant. Panel B presents *High* and *Low* coefficients for the U.S. (the base country) together with difference between these and the respective coefficients in other countries. Robust t-statistics clustered by fund are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

Panel A – Convexity by Country

	Raw returns		One-factor alpha		Four-factor alpha	
Country	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
U.S.	0.069***	0.00	0.094***	0.00	0.073***	0.00
Australia	0.097	0.59	-0.080	0.44	0.064	0.58
Austria	0.100	0.37	-0.026	0.64	0.139	0.37
Belgium	-0.128*	0.06	-0.100	0.53	-0.038	0.92
Canada	0.183***	0.00	0.177***	0.00	0.179***	0.00
Denmark	0.231	0.28	0.112	0.48	0.231	0.55
Finland	0.023	0.90	-0.095	0.15	0.052	0.60
France	0.043	0.25	0.017	0.32	0.029	0.85
Germany	0.006	0.95	0.022	0.49	-0.033	0.86
Hong Kong	0.764	0.15	0.811	0.20	0.474	0.54
India	1.474***	0.00	1.666***	0.00	1.586***	0.00
Indonesia	0.962	0.61	1.065	0.50	0.841	0.70
Ireland	0.293	0.20	0.065	0.37	0.065	0.52
Italy	0.148**	0.01	0.100	0.16	0.080	0.13
Japan	0.034	0.34	0.047	0.53	0.023	0.54
Malaysia	-0.029	0.71	0.008	0.93	-0.015	0.95
Netherlands	-0.152***	0.00	-0.095	0.27	-0.074	0.84
Norway	0.072	0.54	0.256*	0.06	0.248	0.39
Poland	0.687	0.64	-0.013	0.94	-0.232	0.84
Portugal	-0.085	0.48	-0.011	0.65	-0.140	0.19
Singapore	0.333***	0.00	0.228***	0.00	0.268***	0.00
South Korea	0.166	0.50	0.136	0.52	0.078	0.91
Spain	0.138*	0.08	0.188*	0.08	0.251***	0.00
Sweden	0.170***	0.00	0.165	0.12	0.232*	0.07
Switzerland	0.028	0.73	-0.023	0.61	-0.041	0.58
Taiwan	0.736*	0.05	1.119***	0.00	1.098***	0.00
Thailand	0.158*	0.06	0.215***	0.00	0.165**	0.01
U.K.	0.098**	0.04	0.093**	0.01	0.113***	0.00

Panel B – Flow-Performance Sensitivities relative to the U.S.

	Raw returns				One-factor alpha				Four-factor alpha			
	Low		High		Low		High		Low		High	
Country	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
U.S. (Base)	0.098***	6.90	0.155***	8.01	0.104***	7.590	0.198***	10.53	0.061***	4.23	0.134***	6.97
Australia	0.052	0.37	0.092	0.79	0.109	1.070	-0.065	-0.44	-0.044	-0.39	-0.053	-0.49
Austria	-0.051	-0.65	-0.008	-0.09	0.068	0.960	-0.052	-0.76	0.017	0.28	0.083	0.94
Belgium	-0.044	-0.83	-0.229***	-3.83	-0.003	-0.050	-0.197***	-2.82	-0.029	-0.54	-0.140**	-2.09
Canada	-0.043	-1.55	0.086**	2.22	-0.020	-0.750	0.063*	1.65	-0.044	-1.53	0.066*	1.79
Denmark	0.073	0.43	0.247	1.25	0.214	1.080	0.232	1.12	-0.054	-0.31	0.104	0.50
Finland	0.057	0.43	0.023	0.19	-0.050	-0.360	-0.239**	-1.96	-0.081	-0.59	-0.102	-1.00
France	0.011	0.39	-0.003	-0.08	0.022	0.720	-0.055	-1.54	-0.005	-0.18	-0.049	-1.38
Germany	0.006	0.18	-0.045	-1.00	0.032	0.960	-0.040	-0.88	0.096***	2.80	-0.018	-0.37
Hong Kong	-0.098	-0.32	0.609	1.48	0.398	0.950	1.115**	2.12	0.255	0.64	0.656*	1.86
India	-0.197	-0.91	1.227***	4.07	-0.151	-0.680	1.422***	3.57	-0.194	-0.85	1.323***	3.13
Indonesia	0.078	0.11	0.983	1.31	0.475	0.660	1.446***	3.70	0.875	1.09	1.643**	2.19
Ireland	0.055	0.33	0.291*	1.75	0.280*	1.670	0.251	1.43	0.078	0.48	0.070	0.34
Italy	-0.030	-0.81	0.061	1.18	0.012	0.330	0.018	0.38	0.043	1.11	0.050	1.17
Japan	-0.121***	-5.31	-0.144***	-4.36	-0.132***	-5.400	-0.179***	-5.56	-0.084***	-3.20	-0.134***	-3.97
Malaysia	-0.089*	-1.84	-0.175***	-3.33	-0.039	-0.750	-0.125**	-2.09	-0.001	-0.02	-0.089	-1.44
Netherlands	0.020	0.52	-0.189***	-4.14	0.023	0.550	-0.166***	-3.54	0.014	0.32	-0.133***	-3.26
Norway	0.020	0.21	0.035	0.42	-0.092	-0.850	0.070	0.73	-0.005	-0.06	0.175**	2.18
Poland	-0.349	-0.50	0.281	0.86	0.490	0.740	0.383	1.08	0.438	1.09	0.133	0.37
Portugal	-0.039	-0.29	-0.181**	-1.97	0.113	1.060	0.008	0.07	0.121	0.94	-0.092	-0.66
Singapore	-0.162***	-3.58	0.114	1.53	-0.090**	-2.090	0.044	0.56	-0.071	-1.46	0.125*	1.70
South Korea	-0.084	-0.90	0.025	0.27	-0.082	-0.930	-0.040	-0.43	0.076	0.94	0.081	0.85
Spain	-0.065	-1.18	0.016	0.25	-0.020	-0.420	0.074	1.18	-0.113*	-1.95	0.065	1.10
Sweden	-0.110**	-2.55	0.003	0.06	-0.082**	-2.000	-0.011	-0.21	-0.104**	-2.30	0.055	1.01
Switzerland	-0.031	-0.56	-0.060	-0.98	0.015	0.270	-0.102	-1.52	0.094*	1.87	-0.022	-0.39
Taiwan	0.339**	2.10	1.018***	3.22	0.017	0.090	1.042***	3.36	0.038	0.19	1.063***	3.59
Thailand	-0.156**	-2.56	-0.055	-0.68	-0.190***	-3.060	-0.069	-0.84	-0.107*	-1.76	-0.015	-0.23
U.K.	-0.002	-0.05	0.039	0.95	-0.002	-0.050	-0.003	-0.07	0.028	0.73	0.068	1.63
Country fixed effects	Yes				Yes				Yes			
Time fixed effects	Yes				Yes				Yes			
Adjusted R-squared	0.248				0.247				0.243			
Number of observations	213,351				213,351				213,351			

Table VII – Country Variables by Country

This table presents country variables averaged across time by country for the period 2001-2007, including economic development variables, financial market development variables, and mutual fund industry development variables. Economic development variables include: the gross domestic product per capita in U.S. dollars (*GDP per capita*); the average number of years in school (*Education*); and the percentage of population that uses the internet (*Internet*). Financial market development variables include: a dummy variable that equals one if the country is an emerging market (*Emerging market dummy*) as defined by MSCI Barra, stock market trading costs (*Trading costs*) given by the annual average stock market transaction cost in basis points; and the quality of the judicial system (*Judicial system*), calculated by the sum of five variables: (1) efficiency of judicial system; (2) rule of law; (3) corruption; (4) risk of expropriation; and (5) risk of contract repudiation. Mutual fund industry development variables include: the age of the mutual fund industry (*Mutual fund industry age*); the mutual fund industry size as a percentage of the country's gross domestic product (*Mutual fund industry size/GDP*); and the level of mutual fund transaction costs, calculated as the average of the sum of front-end and back-end loads (*Mutual fund transaction costs*).

	Economic development			Financial market development			Mutual fund industry		
Country	GDP per capita ($)	Education (%)	Internet (%)	Emerging market dummy	Trading costs (bps)	Judicial system	Mutual fund industry age	Mutual fund industry Size/GDP (%)	Mutual fund transaction costs (%)
Australia	34,671	17.00	69.77	0	32.25	46.50	42	126.63	2.13
Austria	34,289	15.00	47.23	0	30.38	47.36	51	38.74	4.52
Belgium	32,050	16.00	41.31	0	29.88	47.43	60	33.68	2.65
Canada	34,877	14.50	53.99	0	32.33	47.88	75	46.50	4.93
Denmark	34,373	15.50	50.30	0	34.04	48.98	45	39.68	2.82
Finland	33,369	16.50	52.01	0	42.34	48.82	20	28.33	2.08
France	29,871	15.50	38.09	0	27.73	44.87	43	73.25	3.20
Germany	29,173	15.00	41.43	0	26.84	46.83	58	12.04	4.40
Hong Kong	41,614	11.00	50.78	0	41.71	43.85	47	232.50	3.65
India	3,499	11.00	4.33	1	65.48	30.61	43	1.16	2.71
Indonesia	4,200	9.50	6.95	1	71.46	21.88	11	1.10	3.01
Ireland	43,091	14.50	28.21	0	84.60	35.18	34	351.27	4.91
Italy	28,738	15.00	42.68	0	31.79	39.73	24	27.00	3.24
Japan	30,214	14.00	56.14	0	20.78	46.86	42	11.38	2.37
Malaysia	10,941	12.00	39.98	1	56.00	38.54	48	12.26	6.40
Netherlands	33,580	16.00	65.09	0	27.71	49.33	78	18.21	1.76
Norway	41,456	17.00	56.14	0	32.35	49.59	14	19.16	3.03
Poland	14,103	14.50	25.14	1			15	3.51	4.63
Portugal	21,376	15.50	26.72	0	33.03	39.03	21	12.83	2.24
Singapore	29,675	16.00	55.27	0	40.26	44.95	48	238.25	4.69
South Korea	21,786	15.00	65.14	1	56.32	33.55	38	18.09	0.05
Spain	26,593	15.50	30.32	0	31.58	39.35	49	26.51	0.94
Sweden	31,818	16.00	69.66	0	30.97	48.98	49	41.17	0.66
Switzerland	35,579	15.50	46.41	0	29.91	49.96	69	43.51	4.88
Taiwan	31,723	11.00		1	47.86	40.40	23	8.83	2.74
Thailand	8,360	11.00	10.01	1	59.47	29.67	12	3.62	1.24
U.K.	32,753	16.50	44.67	0	50.85	47.01	73	27.53	4.35
U.S.	40,144	16.00	59.51	0	24.41	47.61	83	72.01	2.57
All Countries	33,329	15.45	50.68		31.53	45.79	43	53.10	3.03

Table VIII - The Determinants of Flow-Performance Sensitivity – Economic Development

This table presents the results of panel regressions of individual fund flows on lagged performance and lagged performance interacted with a set of country level variables using a sample of 28 countries. Weighted least squares regression is used where each fund is weighted by the inverse of the number of funds in each country-quarter. The dependent variable is fund *flows* and the independent variables are piecewise lagged performance, control variables, lagged piecewise performance interacted with economic development variables. A piecewise linear regression is used to define three linear segments in the flow-performance relationship. In each quarter, by country, fractional performance ranks ranging from zero to one are assigned to funds according to their average raw returns in the past four quarters, one-factor alpha and four-factor alpha. This procedure uses three performance variables: $Low_{i,c,t-1}=min(0.2,Rank_{i,c,t-1})$, $Mid_{i,c,t-1}=min(0.6,Rank\text{-}Low_{i,c,t-1})$, and $High_{i,c,t-1}=Rank\text{-}(Low_{i,c,t-1}+Mid_{i,c,t-1})$. Control variables are the same as in Table 5 (coefficients not reported). Proxies for economic development include the natural log of gross domestic product per capita in U.S. dollars lagged by one quarter *(Log GDPC $_{t-1}$)*; the natural log of the number of years of education (averaged for men and women) lagged by one quarter *(Log education $_{t-1}$);* and the natural log of the percentage of population that use the internet lagged by one quarter *(Log internet $_{t-1}$)*. Robust t-statistics clustered by fund are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

	Raw returns			One-factor alpha			Four-factor alpha		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Low t-1	-0.675	-0.224	-0.111	0.330	0.633	0.272	0.936	1.114	0.354
	(-0.98)	(-0.34)	(-0.55)	(0.53)	(0.94)	(1.38)	(1.16)	(1.22)	(1.47)
Low t-1 x Log GDP per capita t-1	0.015***			0.012**			0.018***		
	(3.11)			(2.00)			(3.51)		
Low t-1 x Log education t-1		0.107			-0.189			-0.378	
		(0.45)			(-0.76)			(-1.13)	
Low t-1 x Log internet t-1			0.047			-0.042			-0.072
			(0.92)			(-0.81)			(-1.16)
Mid t-1	0.733***	0.903***	0.276***	0.447*	0.622**	0.154*	0.440*	0.628**	0.173**
	(2.70)	(2.81)	(3.24)	(1.82)	(2.16)	(1.96)	(1.85)	(2.30)	(2.32)
Mid t-1 x Log GDP per capita t-1	-0.067**			-0.040*			-0.040*		
	(-2.53)			(-1.68)			(-1.72)		
Mid t-1 x Log education t-1		-0.314***			-0.216**			-0.219**	
		(-2.67)			(-2.05)			(-2.19)	
Mid t-1 x Log internet t-1			0.061***			0.011*			0.038*
			(2.76)			(1.69)			(1.94)
High t-1	3.897***	4.405**	1.407***	5.176***	5.646***	1.910***	4.769***	5.423***	1.722***
	(2.58)	(2.49)	(2.90)	(3.15)	(3.01)	(3.22)	(2.67)	(2.59)	(2.79)
High t-1 x Log GDP per capita t-1	-0.363**			-0.485***			-0.450***		
	(-2.48)			(-3.04)			(-2.59)		
High t-1 x Log education t-1		-1.549**			-1.992***			-1.927**	
		(-2.39)			(-2.90)			(-2.52)	
High t-1 x Log internet t-1			-0.329***			-0.456***			-0.417**
			(-2.59)			(-2.93)			(-2.57)
Log GDP per capita t-1	-0.006			0.005			0.016		
	(-0.61)			(0.56)			(1.33)		
Log education t-1		0.045			0.078**			0.112**	
		(1.51)			(2.24)			(2.31)	
Log internet t-1			-0.004			0.006			0.013
			(-0.51)			(0.85)			(1.40)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.064	0.063	0.065	0.065	0.064	0.067	0.062	0.061	0.064
Number of observations	213,351	213,351	212,090	213,351	213,351	212,090	213,351	213,351	212,090

Table IX - The Determinants of Flow-Performance Sensitivity – Financial Market Development

This table presents the results of panel regressions of individual fund flows on lagged performance and lagged performance interacted with a set of country level variables using a sample of 28 countries. Weighted least squares regression is used where each fund is weighted by the inverse of the number of funds in each country-quarter. The dependent variable is fund *flows* and the independent variables are piecewise lagged performance, control variables, lagged piecewise performance interacted with financial market development variables, and financial market development variables. A piecewise linear regression is used to define three linear segments in the flow-performance relationship. In each quarter, by country, fractional performance ranks ranging from zero to one are assigned to funds according to their average raw returns in the past four quarters, one-factor alpha and four-factor alpha. This procedure designates three performance variables: $Low_{i,c,t-1}=min(0.2,Rank_{i,c,t-1})$, $Mid_{i,c,t-1}=min(0.6,Rank-Low_{i,c,t-1})$, and $High_{i,c,t-1}=Rank-(Low_{i,c,t-1}+Mid_{i,c,t-1})$. Proxies for financial market development measures include an emerging market dummy (*Emerging market dummy*), that equals one if the country is an emerging country and zero if the country is a developed country, the natural log of the average stock market transaction costs lagged by one quarter *(Log trading costs $_{t-1}$);* and a quality of the judicial system dummy (*Judicial system*). Robust t-statistics clustered by fund are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

	Raw returns			One-factor alpha			Four-factor alpha		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Low t-1	0.075***	0.120	0.057**	0.114***	-0.144	0.128***	0.064***	-0.312	0.098***
	(4.20)	(0.54)	(2.29)	(6.41)	(-0.60)	(4.84)	(3.71)	(-1.10)	(3.30)
Low t-1 x Emerging market dummy	-0.051			0.057			0.163		
	(-0.40)			(0.62)			(1.57)		
Low t-1 x Log trading costs t-1		-0.016			0.070			0.106	
		(-0.26)			(1.00)			(1.29)	
Low t-1 x Judicial system			0.017			-0.048			-0.059
			(0.49)			(-1.27)			(-1.50)
Mid t-1	0.041***	-0.177*	0.065***	0.027***	-0.162*	0.040***	0.027***	-0.160*	0.043***
	(8.54)	(-1.96)	(7.11)	(5.47)	(-1.74)	(4.06)	(5.96)	(-1.94)	(5.00)
Mid t-1 x Emerging market dummy	0.081**			0.067**			0.059*		
	(2.43)			(2.07)			(1.80)		
Mid t-1 x Log trading costs t-1		0.065**			0.056**			0.055**	
		(2.46)			(2.30)			(2.29)	
Mid t-1 x Judicial system			0.026**			0.019*			0.016
			(2.17)			(1.90)			(1.44)
High t-1	0.130***	-1.332***	0.313***	0.157***	-1.299**	0.381***	0.124***	-1.324**	0.337***
	(6.33)	(-2.78)	(5.42)	(7.22)	(-1.97)	(4.46)	(5.49)	(-1.97)	(3.95)
High t-1 x Emerging market dummy	0.494***			0.586***			0.520***		
	(2.84)			(2.89)			(2.58)		
High t-1 x Log trading costs t-1		0.433***			0.436**			0.433**	
		(3.08)			(2.25)			(2.19)	
High t-1 x Judicial system			-0.180***			-0.242***			-0.219**
			(-2.81)			(-2.71)			(-2.45)
Emerging market dummy	-0.008			-0.026			-0.041**		
	(-0.32)			(-1.58)			(-2.51)		
Log trading costs t-1		-0.013			-0.026**			-0.032**	
		(-1.36)			(-2.53)			(-2.51)	
Judicial system			0.018***			0.024***			0.029***
			(3.33)			(4.12)			(4.54)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.061	0.052	0.050	0.062	0.052	0.050	0.059	0.049	0.047
Number of observations	213,351	212,955	212,955	213,351	212,955	212,955	213,351	212,955	212,955

Table X - The Determinants of Flow-Performance Sensitivity – Mutual Fund Industry Development

This table presents the results of panel regressions of individual fund flows on lagged performance and lagged performance interacted with a set of country level variables using a sample of 28 countries. Weighted least squares regression is used where each fund is weighted by the inverse of the number of funds in each country-quarter. The dependent variable is fund *flows* and the independent variables are piecewise lagged performance, control variables, lagged piecewise performance interacted with mutual fund industry development variables, and mutual fund industry development variables. A piecewise linear regression is used to define three linear segments in the flow-performance relationship. In each quarter, by country, fractional performance ranks ranging from zero to one are assigned to funds according to their average raw returns in the past four quarters, one-factor alpha and four-factor alpha. This procedure designates three performance variables: $Low_{i,c,t-1}=min(0.2,Rank_{i,c,t-1})$, $Mid_{i,c,t-1}=min(0.6,Rank-Low_{i,c,t-1})$, and $High_{i,c,t-1}=Rank-(Low_{i,c,t-1}+Mid_{i,c,t-1})$. Control variables are the same as in Table 5 (coefficients not reported). Proxies for mutual fund industry development include the natural log of the age of the mutual fund industry lagged by one quarter *(Log MF industry age $_{t-1}$)*; the natural log of mutual fund industry size divided by the country's GDP lagged by one quarter *(Log MF industry size/GDP $_{t-1}$);* and the level of mutual fund transaction costs in each country lagged by one quarter, calculated as the average of the sum of front-end and back-end loads *(MF transaction costs)*. Robust t-statistics clustered by fund are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

	Raw returns			One-factor alpha			Four-factor alpha		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Low t-1	-0.024	0.050	0.075*	0.193	0.086***	0.047	0.347	0.086***	0.022
	(-0.09)	(1.32)	(1.68)	(0.99)	(2.85)	(1.16)	(1.50)	(2.62)	(0.51)
Low t-1 x Log MF industry age t-1	0.023			-0.021			-0.072		
	(0.34)			(-0.42)			(-1.21)		
Low t-1 x Log MF industry size/GDP t-1		0.008			0.009*			0.009*	
		(1.59)			(1.69)			(1.77)	
Low t-1 x MF transaction costs t-1			0.019			0.025			0.010
			(0.88)			(1.22)			(0.51)
Mid t-1	0.160**	0.050***	0.039***	0.114	0.038***	0.040***	0.118	0.031***	0.031***
	(2.03)	(5.33)	(3.55)	(1.49)	(4.00)	(3.43)	(1.61)	(3.10)	(2.81)
Mid t-1 x Log MF industry age t-1	-0.029			-0.021			-0.022		
	(-1.43)			(-1.06)			(-1.19)		
Mid t-1 x Log MF industry size/GDP t-1		0.001			-0.007			0.010	
		(0.05)			(-0.51)			(0.84)	
Mid t-1 x MF transaction costs t-1			-0.014**			-0.007*			-0.009*
			(-2.14)			(-1.69)			(-1.87)
High t-1	1.004**	0.194***	0.189***	1.181**	0.246***	0.220***	0.970*	0.201***	0.217***
	(2.23)	(3.66)	(2.95)	(2.20)	(4.59)	(2.95)	(1.81)	(3.87)	(2.95)
High t-1 x Log MF industry age t-1	-0.216*			-0.252*			-0.206*		
	(-1.84)			(-1.91)			(-1.83)		
High t-1 x Log MF industry size/GDP t-1		0.018			0.002			-0.024	
		(0.34)			(0.03)			(-0.40)	
High t-1 x MF transaction costs t-1			-0.005			0.024*			0.022*
			(-0.28)			(1.83)			(1.66)
Log MF industry age t-1	-0.013			-0.006			0.003		
	(-1.11)			(-0.74)			(0.29)		
Log MF industry size/GDP t-1		-0.008			-0.014*			-0.002	
		(-0.99)			(-1.77)			(-0.28)	
MF transaction costs t-1			0.009***			0.005**			0.005*
			(2.64)			(2.00)			(1.87)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.061	0.048	0.058	0.061	0.048	0.058	0.058	0.045	0.055
Number of observations	213,351	213,351	213,351	213,351	213,351	213,351	213,351	213,351	213,351

Table XI – The Impact of Raising Indian Sophistication and Participation Costs to U.S. Levels on Convexity

This table shows levels of economic development variables, financial market development variables and mutual fund industry development variables for India and the U.S. averaged over 2001 to 2007. Economic development variables include: the gross domestic product per capita in U.S. dollars *(GDP per capita)*; the average number of years in school *(Education) and* the percentage of population that uses the internet (*Internet).* Financial market development variables include: a dummy variable that equals one if the country is an emerging market *(Emerging market dummy)* as defined by MSCI Barra, stock market trading costs *(Trading costs)* given by the annual average transaction cost in basis points and the quality of the judicial system (*Judicial system*), calculated by the sum of five variables: (1) efficiency of judicial system; (2) rule of law; (3) corruption; (4) risk of expropriation; and (5) risk of contract repudiation. Mutual fund industry development variables include: the age of the mutual fund industry *(Mutual fund industry age);* the mutual fund industry size as a percentage of the country's gross domestic product *(Mutual fund industry size/GDP);* and the level of mutual fund transaction costs, calculated as the average of the sum of front-end and back-end loads *(Mutual fund transaction costs)*. If the variable proxies for development, we multiply the difference between the coefficients on *High* interacted with the development variable concerned and the coefficient on *Low* interacted with the development variable concerned with the difference in the level of that development variable between the U.S. and India. We do likewise if the variable proxies for participation costs except that instead of considering the impact on *Low* we measure the impact on *Mid*. We consider the impact of variables on *High*, *Mid* or *Low* only if the development or participation costs proxy concerned is statistically significant at the 10% level or above for the relevant performance range. We also calculate the percentage impact of these changes on convexity by dividing these changes by the initial level of Indian convexity estimated using four-factor alpha as the performance measure from Panel A of Table VI.

	Economic development			Financial market development			Mutual fund industry		
	GDP per capita ($)	Education (%)	Internet (%)	Emerging market dummy	Trading costs (bps)	Judicial system	Mutual fund industry age	Mutual fund industry Size/GDP (%)	Mutual fund transaction costs (%)
U.S.	40,144	16	59.51	Non-emerging	24.41	Top	83	72.01	2.57
India	3,499	11	4.33	Emerging	65.48	Bottom	43	1.16	2.71
Difference	36,645	5	55.18		-41.07		40	70.85	-0.15
Change in convexity (High-Low)	-1.142	-0.722	-1.093	-0.520	-0.427		-0.135	-0.037	
Change in convexity (High-Mid)			-1.193			-0.219			-0.005
% Change in convexity (High-Low)	-72.00%	-45.53%	-68.92%	-32.79%	-26.94%		-8.54%	-2.34%	
% Change in convexity (High-Mid)			-96.88%			-17.79%			-0.37%

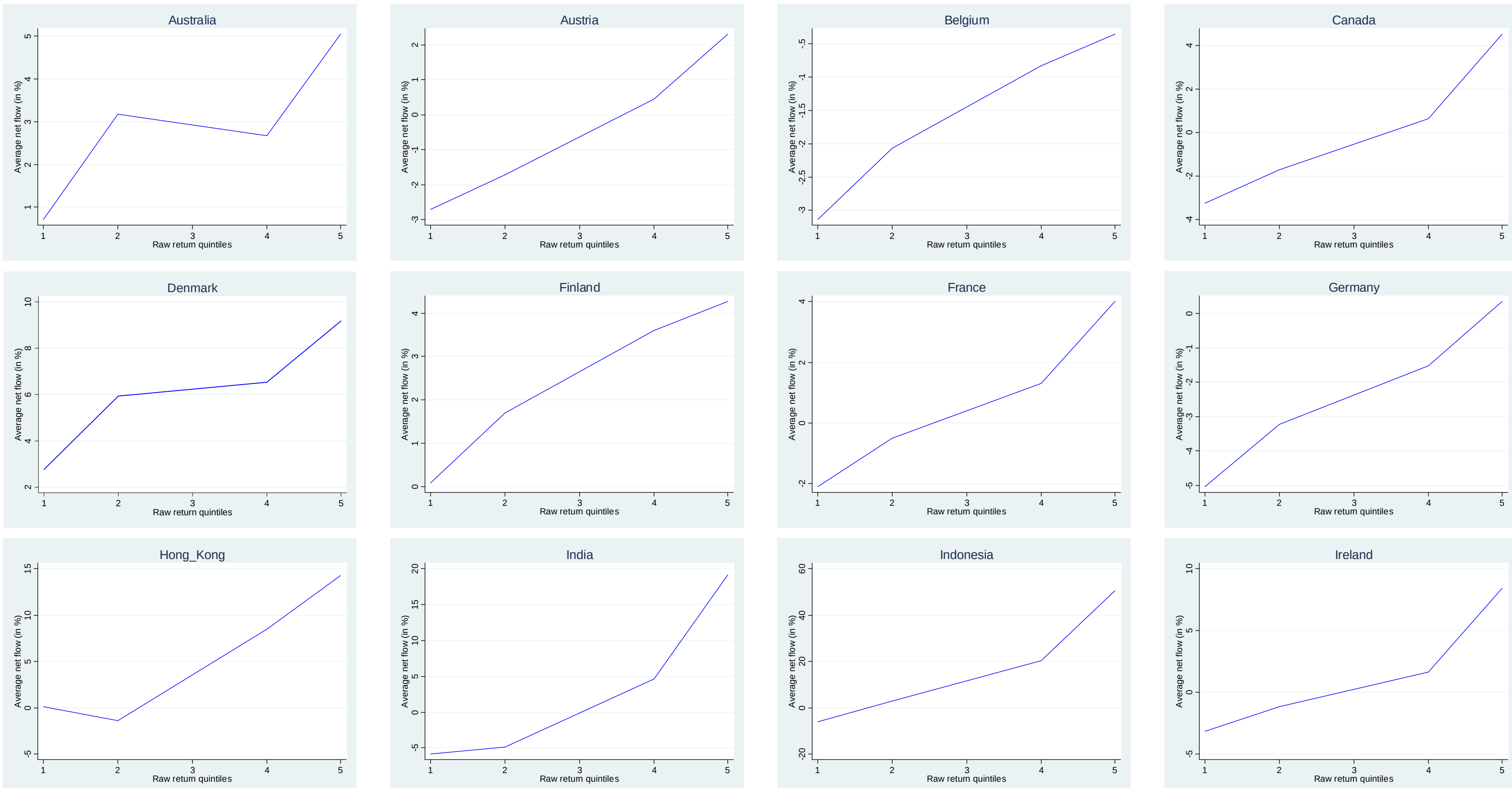
Table XII - The Relationship between Fund Manager Risk Taking and Flow-Performance Convexity

This table presents the results of panel regressions of annualized tracking error measured over the past 12 months on lagged country-level flow-performance convexity and control variables. Convexity is measured at the country-level as the difference between the *High* and *Low* coefficients from our flow-performance regression using the set of control variables presented in Table 5. Control variables include fund size, measured by the natural log of fund's TNA in U.S. dollars lagged (*Log size$_{t-1}$*); natural log of fund age lagged (*Log age$_{t-1}$*); corresponding proxy of fund manager risk taking lagged; lagged convexity interacted with the natural log of fund size lagged *(High minus Low$_{t-1}$ × Log Size $_{t-1}$)*; and lagged convexity interacted with the natural log of fund age lagged *(High minus Low$_{t-1}$ × Log age $_{t-1}$)*. Newey-West adjusted t-statistics are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

	Raw returns			One-factor alpha			Four-factor alpha		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
High minus Low t-1	0.077***	0.024***	0.077***	0.071***	0.035***	0.072***	0.062***	0.028***	0.064***
	(6.33)	(4.04)	(6.31)	(6.20)	(7.13)	(6.33)	(5.15)	(5.56)	(5.45)
Log size t-1	-0.001***		-0.001***	-0.001***		-0.001***	-0.001***		-0.002***
	(-7.68)		(-4.03)	(-7.10)		(-4.09)	(-7.92)		(-4.50)
High minus Low t-1 x Log size t-1	-0.004***		-0.004***	-0.003***		-0.003***	-0.003***		-0.003***
	(-5.13)		(-4.03)	(-4.15)		(-3.07)	(-4.15)		(-2.91)
Tracking error t-1	0.657***	0.660***	0.657***	0.654***	0.657***	0.653***	0.659***	0.662***	0.658***
	(183.99)	(180.07)	(168.60)	(178.68)	(173.48)	(162.50)	(180.66)	(177.22)	(164.40)
Log age t-1		-0.001	0.001		-0.001	0.001		-0.001	0.001
		(-0.89)	(0.41)		(-0.62)	(0.70)		(-0.72)	(0.76)
High minus Low t-1 x Log age t-1		-0.005*	-0.000		-0.008***	-0.004		-0.010***	-0.007**
		(-1.96)	(-0.01)		(-3.62)	(-1.34)		(-4.63)	(-2.55)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052
Number of observations	151,216	151,216	151,216	151,216	151,216	151,216	151,216	151,216	151,216

Figure I – Flows by Raw Return Quintile by Country

This figure presents average quarterly net flows by country by raw return quintile. We first rank funds by average quarterly raw return quintile over the previous four quarters. For each quintile we plot the average net flow.



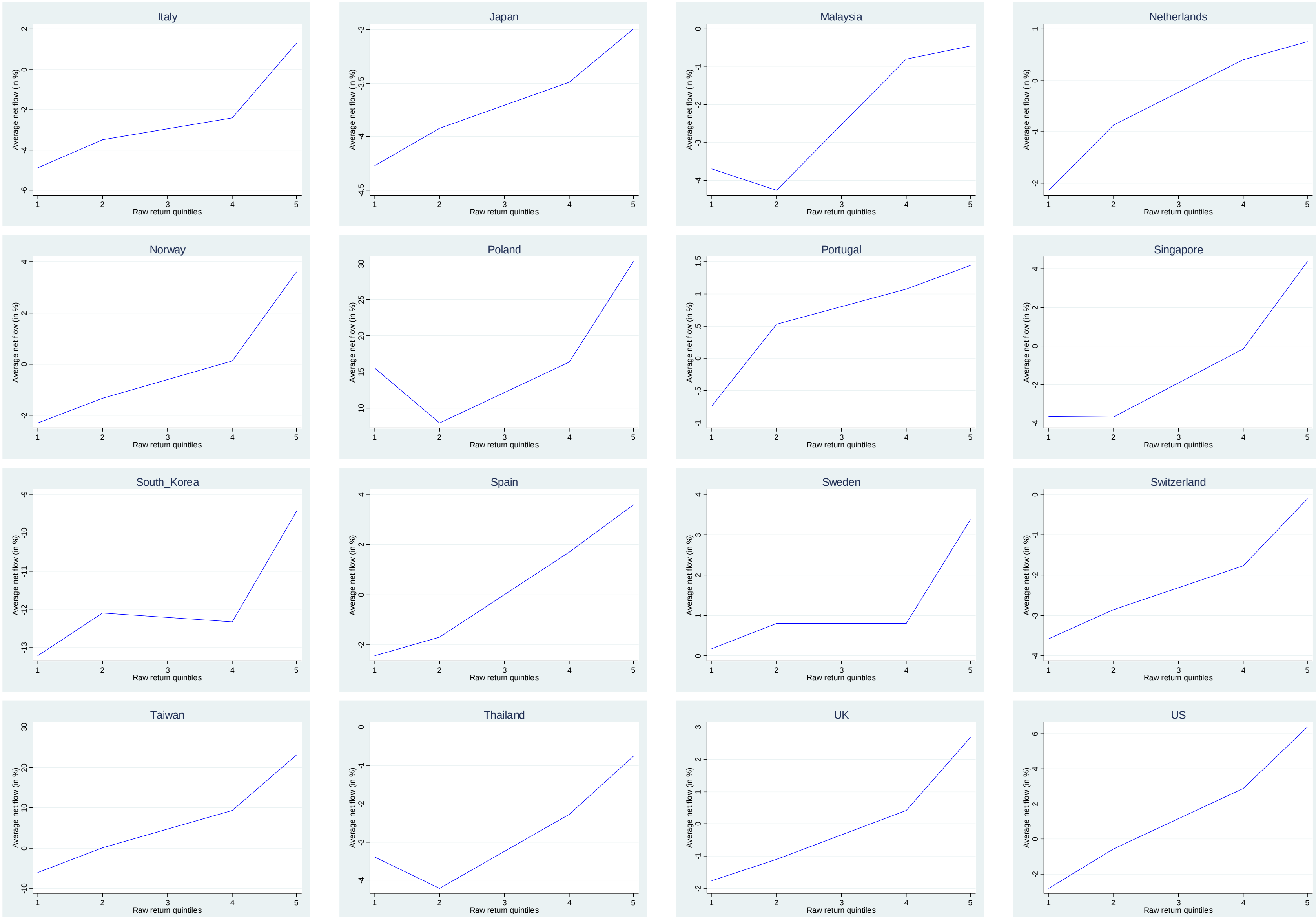
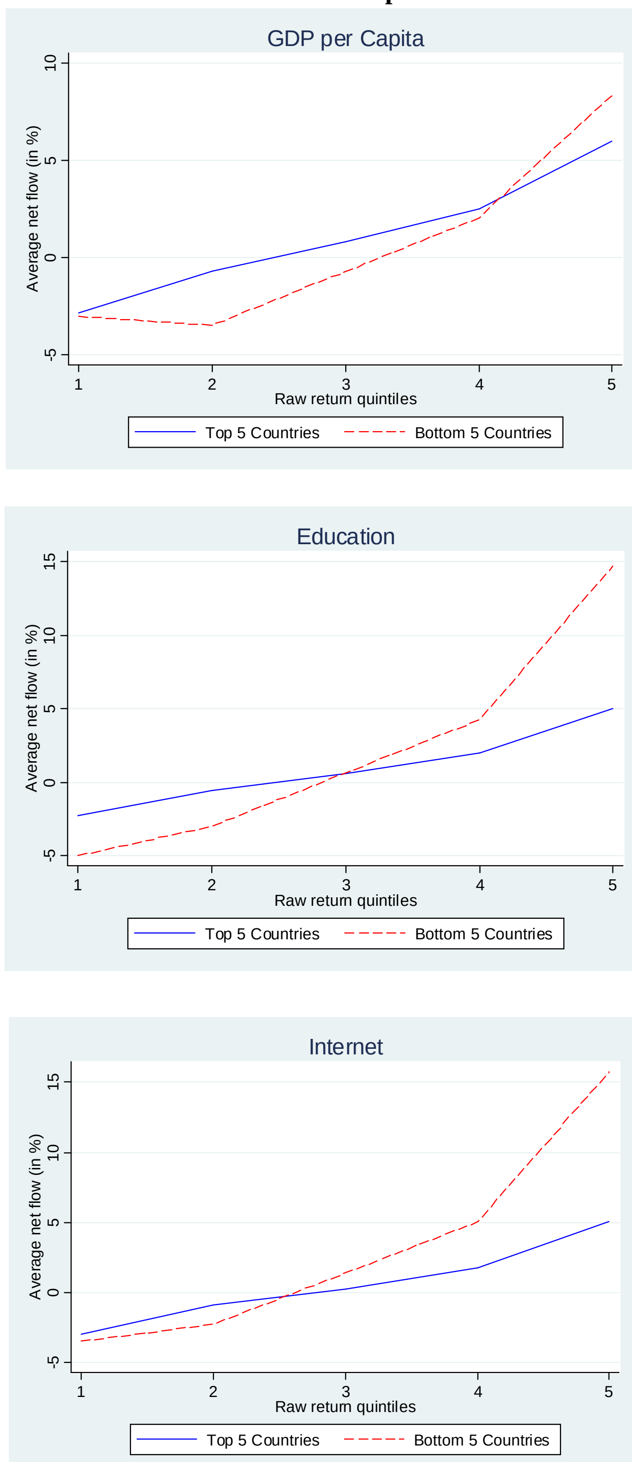

Italy
Japan
Malaysia
Netherlands
Norway
Poland
Portugal
Singapore
South_Korea
Spain
Sweden
Switzerland
Taiwan
Thailand
UK
US
Average net flow (in %)
Raw return quintiles

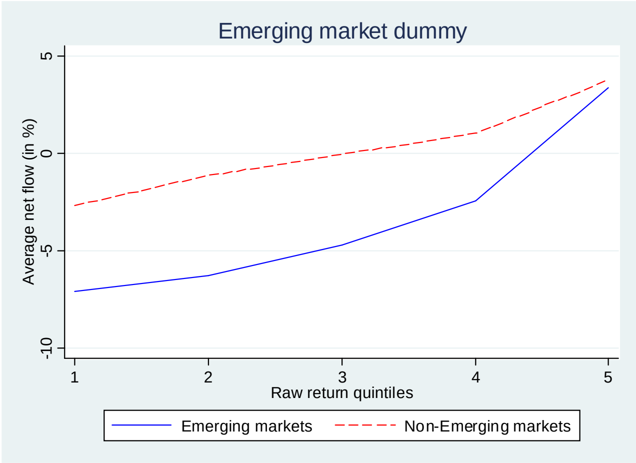
Figure II – The Flow-Performance Relationship Based on Sorts by Country-level Variables

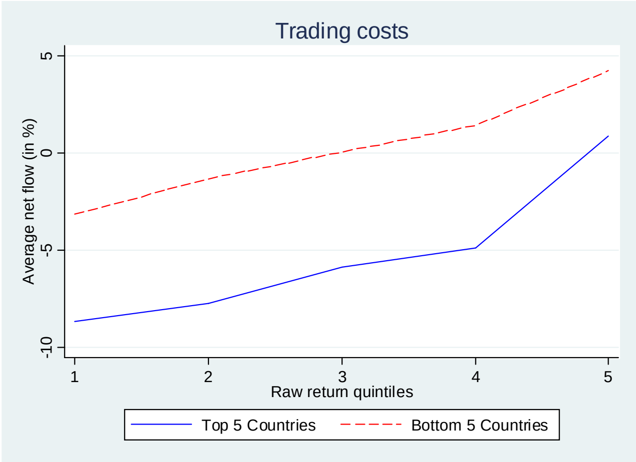
This figure presents quarterly net flows by past year raw return quintile averaged across top and bottom five countries based on country variables sorts. Panel A uses economic development variables, Panel B uses financial market development variables, and Panel C uses mutual fund industry development variables. In the case of the emerging dummy market variable, we average across all emerging market countries and non-emerging market countries. In the case of the judicial system dummy our graph depict the flow-performance relationship for the top half and the bottom half of countries ranked by this variable.

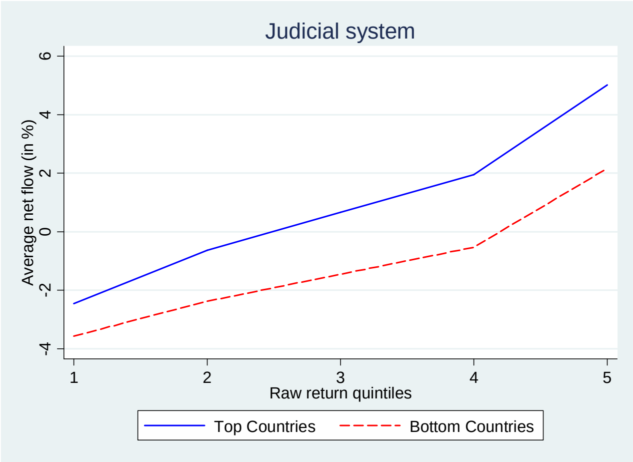
Panel A – Economic Development Variables



Panel B – Financial Market Development Variables







Panel C – Mutual Fund Industry Development Variables