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INVESTOR REACTION TO MUTUAL FUND PERFORMANCE:
EVIDENCE FROM UK DISTRIBUTION CHANNELS

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Aneel Keswani and David Stolin [*]

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ABSTRACT

Investor reaction to mutual fund performance conditions the behavior of mutual fund managers and fund complexes and thus has widely reaching ramifications for the trading of assets worldwide. In particular, the mutual funds literature has long argued that convexity in the money flow-performance relation influences risk-taking by funds. Existing empirical studies, however, largely focus on the average US investor, obscuring the possibly disparate contributions of different clienteles. We analyze UK data on monthly fund sales and purchases made via seven distinct distribution channels. We show that there exist marked differences in the reaction to fund performance between different types of retail and institutional investors. These differences can be understood by considering the incentives of parties involved in each distribution channel. Our flow-performance analysis by channel indicates that the well-documented aggregate net flow-performance convexity in mutual funds is driven by the extreme reaction of retail inflows to favorable performance particularly from independently advised investors.

Understanding the determinants of mutual fund money flows has been the goal of an impressive amount of recent empirical research (Gruber (1996), Sirri and Tufano (1998), Bergstresser and Poterba (2002), Nanda et al. (2004), Barber et al. (2005), and many others). While this literature has repeatedly demonstrated that the net flow-performance relationship across all investors is convex, it has been much less vocal regarding who the different investors are and whether they all act in similar ways.[1] In particular we have little idea of the range of flow-performance relationships across mutual fund investors and whether the different incentives they face might influence the way they buy and sell funds. Limited data on investor behavior has been a key reason for this oversight. Understanding the investment behavior of different mutual fund clienteles would reveal which investors and which of their decisions are responsible for the aggregate flow performance relationship we observe. In addition, doing so would give us greater insight into the incentives asset managers face and also inform us of the strategies that funds might use to maximize fee income and assets under management. Hence understanding how different clienteles react to fund performance is an issue of first-order importance to fund sponsors.[2]

We are able to address these issues by relying on a unique British dataset where fund flows can be studied in greater detail than hitherto possible in a comprehensive sample. For each fund, sales and repurchases are observed every month. In addition, money flows from retail and institutional investors are kept separate. Lastly, retail and

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[1] By contrast, the corresponding issues are much better understood in the context of stock investing (e.g. Grinblatt and Keloharju (2000)).
[2] Boudoukh et al. (2003) discuss the impact of the performance-flow relationship on the stream of fees earned by mutual fund companies.

institutional flows are disaggregated by distribution channel. Thus, each month and for each fund, we know, for example, the amount of money put in by retail investors acting through a financial advisor and the amount of money withdrawn by pension funds. Our dataset covers the majority of the U.K.'s domestic equity mutual funds over the 1992-2001 period and is not limited to survivors. Our data allow us to examine whether there are meaningful differences in the way fund flows respond to past performance for different distribution channels, to understand which investors are responsible for the well documented convexity in aggregate net flows and to shed light on the role of incentives in shaping the flow-performance relation.

Our research contributes to a burgeoning empirical literature on mutual fund investor behavior. Following the seminal flow-performance work by Ippolito (1992), Gruber (1996), Chevalier and Ellison (1997) and Sirri and Tufano (1998), to understand the net flow-performance relation in greater depth, a second strand of the literature separately examines fund investor buying and selling behaviors (O'Neal (2004), Ivkovic and Weisbenner (2009)). They document that outflows behave quite differently from inflows, highlighting the dangers of using net flow data to understand investor buying and selling actions. A third strand of work has studied money flows originating from different categories of investors (Del Guercio and Tkac (2002), Bergstresser et al. (2007), James and Karceski (2006), Christoffersen et al. (2007)). Del Guercio and Tkac (2002) find differences between the flow-performance relation of retail mutual fund investors and institutional investors. They show that retail investors chase past winners with far greater intensity than institutional investors and that only institutional investors sell

poorly performing funds. This results in retail flows being markedly more convex than institutional flows. James and Karceski (2006) observe that investors in institutional funds are less reactive to raw performance but more reactive to risk-adjusted performance than are investors in retail funds. Bergstresser, Chalmers and Tufano (2007) and Christoffersen, Evans and Musto (2007) examine whether brokers put a brake on investors' behavioral biases by reducing flow-performance sensitivity. While Bergstresser, Chalmers and Tufano suggest that this is not the case, Christoffersen, Evans and Musto using more disaggregated flow data find that it is retail investors who invest without a broker that have the highest flow-performance sensitivity.

To date, work on the determinants of mutual fund flows has been overwhelmingly U.S.-based. Examining what drives money flows in the mature and substantial U.K. mutual fund marketplace provides a much needed out-of-sample test of our understanding of this area that has been lacking to date. In addition, in at least one respect, the U.K. is a "cleaner" institutional setting to study how investors select funds than is the U.S. In the U.S. capital gains tax overhang considerations complicate fund purchase and sale decisions for investors and therefore make the interpretation of the observed relation between flows and fund performance more difficult. This issue does not arise in the U.K.

Our main results are as follows. We find that there are statistically significant differences in the flow-performance relationship across distribution channels both within retail and within institutional categories. This is important because it tells us that

changes in distribution channel mix can lead to very different outcomes in terms of the aggregate flow-performance relationship we observe.

How do flow-performance sensitivities differ across the different distribution channels? Retail channels as a whole are more responsive to fund performance than institutional channels and this comes through at the individual channel level. Among the retail channels, independently advised investor flows chase winners and sell losers most strongly. At the other end of the flow sensitivity spectrum, tied-agents investors do not react to poor or favorable performance with their buys and sells. In between these two channels we have the private clients' channel where investors don't sell losers but do actually chase winners, and the direct investors' channel where there is significant evidence of winner chasing and loser selling although at a much more restrained level than for the independently advised investor channels. For our institutional channels, we find that flows into mutual funds from pension funds are performance responsive, as are insurer flows that derive from insurance products where insurers sell a menu of mutual funds to retail investors. In contrast, where buy and sell decisions of mutual funds are made by insurers at the company level rather than at the individual level, we find that flows are not performance responsive.

It is possible to understand these differences in the flow-performance relationship across channels by examining the incentives of parties involved in each channel. Three out of our four retail channels involve advisors. When advisors are paid each time that investors switch funds (as is the case for the independent advisor channel), then not surprisingly

investors are more sensitive responsive to both poor and favorable performance. However, when advisors are not paid in a "transaction-based" fashion and the advisor client relationship is more long-term (as is the case for tied-agent advisors and private client advisors), we find that outflow sensitivities are much lower. This is consistent with advisors telling clients to weather performance-related storms especially if they understand that chasing past performance is not worthwhile. Direct investors that are neither pushed by transaction-based advisors nor restrained by long-term advisors show an intermediate level of flow-performance sensitivity, as we might expect.

Incentives also play a vital role in explaining institutional mutual fund flow behavior. The performance sensitivity of flows from pension funds can be rationalised if we understand that pension funds are typically advised by consultants who need to justify their hiring. As their recommendations are more likely to be acted on following extremes of poor and favourable performance, unsurprisingly we see high flow-performance sensitivity for this channel.

Incentives can also explain the flow-performance relationship for the two insurer channels. For the channel where insurers offer a changing menu of mutual funds to retail clients we see high inflow sensitivities to performance. This is consistent with their incentives as they know that to maximize retail inflows they need to offer funds that have recently done well and to withdraw from funds that have recently done poorly. As a result, we observe inflows for this channel that are very sensitive to favorable performance. As these changes to the menu of funds offered by insurers affect inflows

but not outflows, it is not surprising that we see limited outflow sensitivity to poor fund performance for the unitised insurer channel. As such menu-based incentives are not present for the second insurer channel where flow decisions are made at the company level rather than at the individual investor level, we see much lower levels of flow-performance sensitivity for this channel.

Our results also shed light on the origins of the well-documented convexity in the aggregate flow-performance relationship. We show that it is the convexity of inflows rather than outflows that explain aggregate convexity and in particular the convexity of retail inflows. Fund sales primarily through the independently advised channel are responsible for the retail inflow convexity observed.

The remainder of the paper is organized as follows. Section I discusses features of the various investment channels used to access mutual funds in the U.K. Section II introduces our mutual fund data and variables and demonstrates that there are clear differences in the inflow-performance and the outflow-performance relation which we study separately in Sections III and IV, respectively. Section V discusses our findings and concludes.

I.   Institutional Background: Fund Distribution in the U.K.

While mutual fund distribution in the U.S. has been addressed in a number of recent papers, much less is known about this issue for other countries, the U.K. included. We therefore provide here an overview of mutual fund distribution in the U.K. During the time period we examine, retail investors could buy mutual funds in one of four ways:

directly from a fund management company; using an independent financial advisor (IFA); using a tied agent affiliated to a fund management company; or using a private client advisor.[3] Private client advice refers to portfolio management services offered by banks, stockbrokers and law firms.

Independent advisors are primarily paid on a transaction basis through initial commissions (IFAs received 90% of their money in the form of commissions during our sample period, Datamonitor, 2001) with this fee coming from the front-end payment made by retail investors.   In particular, if an existing investor switches funds outside the current fund family, the independent advisor receives the front-end payment again. In contrast, tied agents affiliated to one family are paid through a combination of salary and commissions. While they might be paid for new money invested, they are not paid for money switches between funds in the same family as this money is seen as being already "captive" within the fund management company. Therefore the incentive to encourage investor switches is present for independent advisors but not for tied agent advisors. Private client advisors are typically paid through fixed fee or as a percentage of assets under management.   As advisors within this channel are not paid on a transaction basis, we would expect less fund switching than for the independent advisors channel and hence lower flow-performance sensitivities.

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[3] During the span of our study, polarization rules were in place in the UK that placed restrictions on the types of companies able to advise retail investors on mutual fund purchases. These rules required that firms either offer fully independent advice and not be tied to any fund management company or be affiliated to one and only one company selling funds. These polarization rules were put in place in 1987 in an attempt to simplify the advisory landscape for retail investors by eliminating the scope for advisors claiming independence when this was in fact not the case.

The main institutions investing into mutual funds in our data are insurance companies and pension schemes. Money invested in mutual funds from insurance companies comes from two distinct sources: unit-linked policies and in-house insurance policies. In the case of unit-linked policies, the insurer gives investors a choice of mutual funds to invest in. We would expect that in order to maximize their sales insurers would offer funds that have recently done well and withdraw from their offering funds that have recently done poorly, and hence the menu of funds offered to attract fund buys will be performance sensitive. In the case of in-house insurance policies, rather than retail investors choosing over a set of funds, the insurer has discretion over the funds that are selected. Pension schemes, on the other hand, be they corporate or local government-run, all rely on the trustee structure for their investment decisions, and can therefore be reasonably considered as a single category.[4] The decision-makers of these schemes may purchase equity and debt securities directly or may do so indirectly by purchasing units in funds. Pension fund trustees normally rely on pension fund consultants to help them make their allocation decisions.

II.   Data and Variables

A. Money Flow Data

Our key dataset consists of fund-level money flow data collected monthly by the U.K.'s Investment Management Association (IMA) from its member firms over the ten-year

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[4] We include charities together with pensions for the same reason.

period 1992-2001 (the dataset additionally includes monthly fund TNAs).[5] These money

flow data are disaggregated by investor type and distribution channel into the seven

categories discussed in the preceding section:

Retail channels

1) direct investment;

2) investment via an independent

financial advisor;

3) investment via tied sales force;

4) private clients.

Institutional channels

5) unitized insurance;

6) in-house insurance;

7) pension fund channels.

As retail and institutional flows are further disaggregated by investment channel, this

dataset constitutes a refinement of the one used by Keswani and Stolin (2008). The

advantage of our dataset relative to the one Christoffersen et al. (2007) collected for the

U.S. using funds' N-SAR responses is that virtually all money flows – both investor sales

and investor repurchases – are attributed by the fund itself to one of the distribution

channels. By contrast, N-SAR only allows indirect inference of flow type based on

commissions paid, which means that disaggregation is not possible for the case of funds

where different channels coexist, and that only sales to investors, but not redemptions,

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[5]The fact that our database does not cover more recent years is the reverse side of its level of detail, as recent data on channel-level inflows and outflows are deemed to be too valuable to be disclosed at the individual fund level. As the channels discussed in the paper and the incentives of parties involved in each channel remain the same there is no reason to believe that our conclusions would have been different had we used a closer to the present sample

can be studied in this way. Further, only the first three of our seven channels are present in the N-SAR derived dataset.

How different are the investors that use the different channels? According to the IMA, flows associated with the pension fund channel originate from "self-administered pension funds run by private companies and local authorities or from registered charities." The investors that are captured by the two insurance channels are different from each other and are different from the pension fund channel as well. While the unitized insurance channel measures investment decisions by unit-linked policyholders investing through insurers into a set of funds pre-selected by the insurer, the in-house insurance channel captures flow decisions made by insurance companies as part of their asset-liability management.

On the retail distribution side, those entering through the private client channel are high net worth individuals receiving a comprehensive wealth management service of which mutual fund selection is one part. The other three channels – direct, tied agent, and independent sales force (IFA) potentially can be used by the same set of individuals. Nonetheless, the fact that these distribution channels co-exist suggests that they hold different appeals for different client types. Survey evidence such as Alexander at al. (1998) finds that direct retail fund investors who make their decisions unaided are significantly more financially literate than other categories of retail investors. In particular, Alexander et al. show that these investors hold more realistic views on mutual fund persistence and also better comprehend the impact of fund fees on effective fund

returns than investors who use financial advice. Lastly, the distinction between tied versus independent sales force is the subject of a substantial literature (e.g. Berger et al., 1997). In the specific context of UK financial services, Gough and Nurullah (2009) use survey evidence to show that clients relying on IFAs are more likely to be older, wealthier, and male than those relying on tied agents.

Several issues need to be dealt with in preparing our fund money flow data for analysis. First, not all funds are open to all types of fund investors at all times. Rather than eliminating all zero-flow observations which might result in the loss of valuable information, we take a more careful approach. To capture when a given channel is inactive, we exclude zero-flow observations if a channel did not experience any activity since the start of the sample period (i.e. the fund plausibly had not started distributing via that channel) or if the channel did not experience any activity subsequently (i.e. the fund stopped distributing via that channel) or if the channel did not experience any activity for a full year (i.e. the fund suspended distribution via that channel).

Second, we need to make our fund flow measure comparable across channels. Virtually all of the literature on mutual fund flows recognizes that higher levels of existing investment are expected to be associated with higher flow levels, and therefore scales monetary flows by the corresponding stock of money already invested. Unfortunately, channel-level TNA is not available to us. Scaling channels' monetary flow by the same fund-level TNA, while doable, would be misleading. Consider the case of two channels comprised of similar investors, except that the first channel has k times the number of

investors of the second, and consequently averages *k* times the monetary flow of the

second channel. (We would therefore expect the TNA attributable to the first channel to

be around *k* times the TNA attributable to the second channel.) Scaling both channels'

monetary flow by the same fund-level TNA would make the behavior of investors using

the first channel appear *k* times more volatile, and *k* times more reactive to performance,

than the behavior of the second fund's investors – even when we know the two groups of

investors behave alike.

Our normalized flow measure addresses this problem. Our method involves first scaling

each month's flow from each channel into each fund by the fund's value at the start of the

month and then scaling the result by the corresponding aggregate ratio (i.e. all flows via

that channel in that month are divided by the aggregate value at the start of that month of

funds for which these flows are present). This normalized flow measure captures the

growth rate of a fund via a specified distribution channel as compared to the growth rate

of all funds via the same channel. [6] Mathematically, we can write our normalized flows

as

$$nflow(c,d)_i = \frac{flow(c,d)_i}{TNA_i} \Bigg/ \frac{\sum\limits_{flow(c)_i \neq 0} flow(c,d)_i}{\sum\limits_{flow(c)_i \neq 0} TNA_i}$$

where *flow* and *nflow* are the raw and normalized money flows, respectively. These

flows are indexed by *c*, the distribution channel, and *d*, the flow direction, while *i* refers

to the individual fund. *TNA* represents the total net assets of the fund, and

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[6] Rearranging terms, we can also interpret our normalized flow measure as a fund's share of total
money flows via a given channel, scaled by the ratio of the fund's value to the sum of values of
all funds open to that distribution channel.

$flow(c)_i \neq 0$ is shorthand for selecting only fund-months which have some investor

activity (in any direction) for that distribution channel. Time subscripts are suppressed.

To illustrate the workings of the above measure, recall our earlier two-channel example.

In it, the first channel's flow scaled by the (all-channel) TNA would be roughly k times

the corresponding ratio for the second channel – both for the average fund, and in

aggregate. Because our measure divides the flow-to-TNA ratio for each fund-month by

the corresponding aggregate ratio, this adjustment means that our measure avoids

distortion due solely to a channel's size. In other words, it eliminates the possibility that

channels will appear to behave differently even when the underlying investor behaviors

are the same, the only distinction being the scale on which these behaviors are deployed.

It also has the related conceptual advantage that the fund-value weighted mean

normalized flow for each channel is equal to unity by construction.[7]

As our study is preoccupied with investor reaction to fund performance, we exclude

index funds from our sample. We additionally exclude around one percent of highly

unusual fund-months where either sales or repurchases total over a quarter of fund TNA.

Lastly, we require data on investment returns and fund characteristics to be available

(these are described in the next two subsections). Our final sample consists of 31,692

fund-months from February 1992 through December 2001, corresponding to 266 actively

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[7] We choose not to normalize our fund-level percentage flows by the standard deviation of flows for that fund across its channels or alternatively by the standard deviation of flows across funds for that channel as neither approach would allow us to compare flow-performance sensitivities across the different channels as directly as the measure we use.
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managed domestic equity funds per month on average and representing 470 distinct

funds.[8] Table I, Panel A summarizes the distribution of money flows for our sample.

[Table I here]

The first column of Table I, Panel A shows that the number of observations differs

significantly across channels. While there are over 26,000 fund-months with retail

investors' direct and advised fund sales or repurchases, tied agents are responsible for

retail investor activity in 15,550 fund-months and private clients show signs of activity

for only 7,298 fund-months. With respect to institutional investors, it can be seen that

unitized insurance, in-house insurance, and pensions account for 12,370, 6,957 and

12,731 observations respectively. The residual "other" category is only present in 3,914

fund-months (because this small category is heterogeneous and poorly understood, it is

excluded from the analyses to follow). Overall, individual investor activity is present in

30,610 fund-months in our sample as compared to 21,558 fund-months for institutional

investors.[9]

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[8] The IMA obtains money flow information directly from its member companies every month. Not all management groups report this information; however, since information is collected live and historical information is not discarded, there is no bias toward surviving funds in the data collection process. Nonetheless, we confirmed that there is no survivorship bias in our sample: after controlling for the calendar month, the average difference between monthly returns for our sample and for the population of UK equity funds is only -0.9 basis points per month (p-value=0.64).

[9] Prior US work on by-channel mutual fund flows does not allow for funds that serve more than one channel. Bergstresser, Chalmers and Tufano (2007) divide funds in their sample depending on whether investors are buying into the fund primarily through a broker or not. Christoffersen, Evans and Musto (2007) categorize funds using load payments into affiliated broker, unaffiliated broker or no-load categories. One inherent advantage of our dataset is that it more realistically allows for mixed-channel funds; the mean number of distribution channels per fund is 3.9 in our sample and the median number is 4. Interestingly, fewer than seven per cent of funds are

Turning to the size of raw money flows for the different investment channels, we first note that inflows and outflows for each channel are of comparable magnitude, with inflows typically somewhat larger (although there has been a net outflow of direct retail and in-house insurance money from U.K. equity sectors during the 1992-2001 time period). However, there are significant differences in flow size and variability across channels. For example, monthly inflows intermediated by a tied agent are over four times larger on average than direct inflows, and their standard deviation is likewise over four times larger. The analogous ratios for pensions as compared to in-house insurance are around two. Such differences across channels greatly complicate comparisons of different investors' behaviors, notably in studying investor reactions to past performance. Further, simply expressing fund money flow as percentage of fund TNA is of little help because the different types of flows often pertain to the same fund-months (for example, in the case of direct and independent advisor flows, the overlap is over 90 percent) and even when this is not the case, fund sizes are not proportionate to flow amounts for the different channels. When, however, flows are normalized both by fund size and by the ratio of total flows to total fund size for the channel-month in question, then the variability of the flow measure across channels is much reduced. For example, the mean direct and tied agent inflows are now 1.51 and 1.24, respectively (note that these are equally weighted means; value-weighted means for our normalized flows equal unity by construction). Likewise, their 6.01 and 3.56 standard deviations are much closer to one another than are the standard deviations for the corresponding raw flows. The same is

distributed through a single channel in our data, implying that retaining only the most important channel for each fund would misrepresent over nine-tenths of our sample.

true for most of the rest of Table 1, Panel A. Although our normalization procedure does not equate means and standard deviations across channels perfectly, it is nonetheless a marked improvement on using raw flows, facilitating comparisons of different investors' behavior in subsequent sections. Overall, of the £62.6 billion in money inflows in our sample, £38.9 billion, or 62 percent are due to retail investors; of the £46.9 billion in outflows, £25.4 billion, or 54 percent come from retail investors. Note that looking at net flows would mask most of the investor activity we get to observe.

Table I, Panel B reports correlations among normalized flows for the different investment channels pooled across fund-months. Correlations for inflows are below the diagonal, and correlations for outflows are above the diagonal. We start by noting that, for retail and institutional flows taken in aggregate, correlations are quite low: 0.117 for inflows, and 0.063 for outflows. Correlations between individual channels' normalized inflows range from -0.042 to 0.191, for correlations of in-house insurance with direct and private investor flows, respectively. The range of correlations on the outflow side is even smaller, from -0.029 (direct and tied agent investors) to 0.162 (advised retail flows and pensions). The fact that the seven different channels have such low correlations indicates that total flows are the aggregate result of quite disparate investor behaviors and that to understand the investor decision-making processes that drive the mutual fund marketplace in general and the convexity of the flow-performance relation in particular, it is important to examine the different investment channels individually. The last column of Panel B reports correlations between inflows and corresponding outflows, for each

investment channel. Consistent with U.S. research (e.g. O'Neal (2004)), these correlations are positive, albeit small in magnitude.

B. Fund Returns and Performance Measurement

Our fund return data are survivorship-bias-free and come from Quigley and Sinquefield (2000), who collected monthly returns for the U.K.'s domestic equity funds over the 1975 to 1997 period, and subsequently extended this dataset to the end of 2001. As in U.S. studies, our returns are gross of tax but net of management fees.[10] In addition to raw returns, we measure performance as the Carhart (1997) four-factor alpha. To do so, each month we estimate each fund's factor loadings by running the following regression over the preceding 36 months:

$$R_{it} - RF_t = \alpha + \beta^i_{MKT} MKT_t + \beta^i_{SMB} SMB_t + \beta^i_{HML} HML_t + \beta^i_{UMD} UMD_t + e_{it},$$

where R_{it} is the rate of return on investment i in month t, RF_t is the risk-free interest rate in month t, MKT_t is the return on the market portfolio in excess of the risk-free rate, and SMB_t, HML_t and UMD_t are returns on the size, value, and momentum factor mimicking portfolios, respectively.[11] A fund's four-factor alpha in a given month is obtained by subtracting the products of factor realizations and estimated factor loadings from the

[10] Gross of tax returns could not be collected for approximately 10% of fund-months in our dataset, in which cases we estimate them as the corresponding net return plus the average gross-net difference for that calendar month.

[11] Our monthly size and value factor realizations come from Dimson, Nagel, and Quigley (2003), who confirm the size and value effects in the U.K. Our monthly momentum factor is constructed following Carhart (1997). Specifically, each month we rank all U.K. firms listed on the London Stock Exchange on their 11-month returns lagged by one month, and calculate the difference between the average returns of the highest and the lowest 30% of firms. The only deviation from Carhart's method is that our averages are value-weighted, to avoid spurious results due to "micro-cap" companies. Monthly returns and market capitalizations are taken from London Business School's London Share Price Database.

fund's excess returns. These monthly alphas are then averaged to produce annual four-factor alphas.[12]

[Table II here]

C. Control Variables

The existing literature has identified a number of fund attributes that appear to influence the flow of investor money. While our focus is on the performance-flow relation, we include the most important of these variables as controls. To do so, we manually collect and link across years data from consecutive editions of the annual *Unit Trust Year Book* corresponding to year-end 1991 through year-end 2000. The variables we are able to collect in this way are the fund's initial and annual fees as well as the fund's launch date, which we convert into fund age. In addition, using the data on the identity of the funds' management companies we calculate the number of funds in the fund family. Lastly, we have fund TNA from the most recent month (obtained from the same source as our fund money flows). Table II shows weighted means of these variables, where the weights are inflows taking place through the different distribution channels, except the last two rows of the table, where value- and equally-weighted means are reported. The average fund has £171.1 million in assets under management. Of course, money tends to go to larger funds on average, so that the average pound sterling spent by retail investors is associated with £477.5 in assets under management, and the corresponding figure for institutional investors is greater still, at £858.7 million. Looking at the initial fee, we find that retail investors pay nearly 5 percent on average (note that in practice, the advertised initial fee

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[12] We do not use the alpha directly estimated from the regression because it characterizes the entire 36-month estimation period, whereas we are interested in the impact of shorter-term performance.

may be discounted). Institutional investors, on the other hand, pay substantially less, 3.66

percent (of course, the minimum investment amounts required to access lower initial fees

are larger). This result is due largely to pension funds, whose upfront payments average

below 3 percent. Annual fees, too, are lower for institutional investors, at 0.96 percent as

compared to 1.26 for retail investors.[13] Once again, pension funds' fees are especially

low, 0.8 percent. With regard to fund age, differences across channels are even more

pronounced: for example, retail investors buying into funds directly tend to choose funds

that are 8 years older on average than are funds selected with the help of tied agents.

Lastly, the number of funds in a family averages 20, although pension money tends to go

to funds whose families are quite a bit larger, whereas tied agents favor funds with fewer

siblings.

D. Preliminary Evidence on the Flow-Performance Relation

[Figure I here]

Probably the best known fact about the mutual fund flow-performance relation is the

strong non-linearity of flows with respect to percentiles of past performance. To relate

the present investigation to prior research, in Figure I black squares represent average

U.K. monthly fund flows (expressed as proportion of fund size) by previous year's raw

return decile, for the 1992-2001 period. The non-linearity among the top performers is

immediately apparent: going from the 9th to the 10th decile increases flows by

approximately 1% of fund TNA, whereas dropping from the 9th to the 8th decile costs the

fund less than 0.5% of TNA. Consistent with existing evidence, the performance-flow

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[13] Ideally, we would use the stock of money corresponding to each investor type for this
comparison; unfortunately only flow data are available.

link is less strong among poor performers – although we find it to be pronounced and even visibly non-linear as one approaches the bottom decile.

In addition to average flows, Figure I also shows the average raw return for each fund decile (marked with gray circles), thus representing the relation between fund raw return and its rank. The non-linearity of this graph is unsurprising, as the top and bottom deciles are expected to contain extreme performers. What is remarkable, however, is how closely its shape traces that of the flow-performance relation. This suggests that investors may simply be reacting to the magnitude of the underlying performance measure rather than to its rank – or at least that we can expect there to be much less curvature when flows are related to unranked performance, as we do shortly.

To check this more formally, we sort funds each month into 50 quantiles according to their raw returns over the previous year. We then regress the average flow (relative to fund TNA) on the average monthly raw return over the previous year, as well as on the corresponding return quantile, quantile squared, and quantile cubed. The results (not reported in a table) show that a linear function of raw returns explains flows as well or better than a third degree polynomial in ranked returns. This suggests that the non-linear reaction of flows to relative performance at the very top of the performance scale can largely be explained by the greater magnitude of performance in these quantiles. Fund managers aspiring to the top of the performance scale should therefore recognize that a one notch improvement in fund rank will necessarily involve an ever greater improvement in absolute fund performance as the performance scale is ascended.

[Figure II here]

While Figure I tells us about how flows in aggregate respond to fund performance, it gives us little idea about which parts of the aggregate flow components are responsible. It also focuses on ranked performance, ignoring the magnitude of fund returns, and the effect of non-performance variables on fund flows is unaccounted for. These shortcomings are addressed in Figure II where, for each channel and for each flow direction, we show the fitted values of a smoothed locally polynomial regression of residual flows on the previous year's monthly average mean-adjusted return, that is, return in excess of the equal weighted average of all UK equity fund returns. (The residuals come from regressing normalized flows on the fund's initial and annual fees, as well as the logarithms of fund size, fund age, and the number of funds run by the management group.)

Moving from raw return deciles to mean-adjusted returns and stripping the impact of fund attributes on money flows markedly alters the shape of the performance-flow relation. As suggested by the close correspondence between unranked returns and flows in Figure I, particularly for extreme performers, the relation between flows and unranked performance in Figure II is no longer characterized by two inflection points. Instead, both for inflows and for outflows, the performance-flow link appears to be composed of two linear relations with a break near zero. This suggests that a reasonable parsimonious representation of fund performance in studying the performance-flow relation across

investment channels can separately consider positive and negative performance, allowing

flows to depend linearly on both negative and positive returns. Such a parameterization

will allow us to focus on what is essential about the link between flows and returns: the

strength of the relation, and its curvature.[14] Further, these results emphasize a key finding

by papers that have examined the flow-performance relation for U.S. funds, namely, that

fund buying and fund selling decisions are far from being a mirror image of one another,

and should be examined separately. Therefore, in the next section we address the

behavior of inflows, and we examine outflows in Section IV.

III. Fund Buying Behavior

Previous research as well as the evidence in the preceding section indicate that different

forces guide fund buying and fund selling decisions. In this section we examine the

determinants of the different investor types' fund buying behavior. Given the *prima facie*

evidence on (past) performance chasing, we can expect most of our investor types to

respond to past performance. But how differently do they regard poor and good

performance?

Given the large number of channels that we examine, it is particularly important to

address the curvature of the flow-performance relation in a parsimonious manner to

facilitate cross-channel comparisons. Figure II shows that smoothed performance-flow

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[14] Del Guercio and Tkac (2002) show that (retail) mutual fund investors are characterized by more convex net flows than are institutional pension fund investors. The inflows panel of Figure II appears consistent with these findings as it suggests that inflows are more convex for retail than for institutional investors.

graphs curve the most around the zero mean-adjusted return point. Thus, we partition the

monthly average mean-adjusted return over the preceding 12 months into its positive and

negative components, and regress fund inflows on this partitioned measure of fund

performance together with a set of control variables that may help explain fund inflows.

As our inflow data include zero-flow months, we obtain our estimates using monthly

cross-sectional Tobit regression, drawing inferences using the Fama-MacBeth

methodology with Newey-West robust standard errors.[15] As control variables we include

the fund's initial and annual fees (*InitialFee* and *AnnualFee*, respectively); *FundSize*, the

logarithm of the fund TNA at the previous month-end; *FundAge*, the logarithm of the

number of years since fund launch; and *FamilySize*, the logarithm of the number of funds

in the fund family. To ensure that we are genuinely measuring the sensitivity of inflows

to past performance, we also include two additional variables in our regressions, *Tracking*

and *Timing*. *Tracking* is meant to proxy for the fund's tracking error and is calculated as

the standard deviation of monthly differences in total returns between the fund and the

FTSE All-Share index, which is the most commonly-used performance benchmark in the

UK. *Timing* in our regressions is used to control for the possibility that some funds are

more successful than others in timing the market and that investors pursue such funds

with their inflows. Accordingly, we define *Timing* as the coefficient on the square of the

excess market return when this term is included as the fifth factor in the Carhart model.

[Table III]

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[15] We used five lags in the Newey-West adjustment. Changing the number of lags made little
difference.

Our results in Table III indicate that investors increase their inflows when performance is favorable and reduce their inflows when performance is poor. Comparing these reactions, the response to favorable performance (186.98) is more than quadruple the response to poor performance (39.10) which results in the aggregate inflow-performance relation being significantly convex (p-value < 0.001). As an example of how to interpret these coefficients, the response coefficient to favorable performance tells us that a 1% increase in average monthly fund performance over the past year (i.e. 12% increase in annual performance) leads to the growth rate of the fund relative to the growth rate of all funds rising by approximately 187%.

When we compare retail with institutional investors, we find that institutional investors generally respond to positive and negative performance in a more muted fashion than retail investors. Retail investors are nearly three times more sensitive to favorable performance than institutional investors and are just under twice as sensitive to poor performance. It is possible to understand the way retail and institutional inflows as a whole respond to past performance by looking at the individual channels that comprise retail and institutional flows. Our focus is on the reaction of inflows to favorable performance, as this is where inflows have their greatest influence on the total flow-performance relationship.

Among the retail channels, the independent advisors channel has the highest inflow sensitivity to favorable performance. This is consistent with our expectations as advisors for this channel are paid on a transaction basis and we would expect them to make every

effort to make clients aware of the latest top performing funds in order to encourage them to change their holdings. Tied-agent flows are much more muted in their reaction to favorable fund performance than are flows through the independently advised channel and this can be explained by the fact that these advisors get no additional compensation for getting investors to switch funds. While private client advisors are also generally not paid on a transaction basis, we would expect them to justify their existence to investors by making some fund recommendations and hence it is not surprising that we see a significant positive relationship between inflows and favorable past performance for this channel, albeit not at the level of the independent advisors channel. Direct investors are not held back by advisers in any way in their flow reaction and hence for these investors as well we see a pronounced inflow reaction to favorable fund performance.

As regards institutional flows we find both pension fund inflows and unitized insurance inflows strongly chase past performance. Pension fund trustees are typically advised by external consultants who need to justify the fees they charge by influencing trustee allocations. These consultants are aware that fund trustees are more likely to take notice of their suggestions when their buy recommendations are funds that have done extremely well and when their sell recommendations relate to funds that have done extremely poorly. In light of these incentives that external consultants face, it is not surprising therefore that we observe a high sensitivity of pension fund inflows to favorable performance.

The unitized insurance channel relates to flows from insurers who are selling insurance products that contain menus of mutual funds that retail investors can choose among. To maximize their sales, insurers will have an incentive to rotate the menu of funds they offer over time to include the best recent performers and drop the worst performing funds. This is, in fact, what we see in the data as unitized insurance flows chase favorable fund performance. In contrast, for in-house insurer flows, where channel buy and sell decisions are made at the company level rather than at the individual investor level, flows aren't affected greatly by recent fund performance. This probably reflects insurers' understanding that there is limited persistence in mutual fund data.

The last line of Table III presents details of hypothesis tests conducted to test whether inflows are more sensitive to favorable fund performance than to poor fund performance. These tests shed light on the origins of convexity in the aggregate inflow-performance relationship. Our findings show that retail investors have significantly more convex flows than institutional investors. This convexity among retail investors is attributable to the direct and independently advised channels with both channels, having inflows that are more than ten times more sensitive to positive than to negative performance. We note that although for private client investors the difference between inflow sensitivities to positive and negative performance is nearly as large as it is for direct investors, this difference is not statistically significant, which is at least partly due to the much smaller number of observations for this channel (6,379 versus 23,396). For investments made via tied agents, positive and negative flow-performance sensitivities are both very similar and quite low in magnitude, which is consistent with such investments being limited to a

single family's range of funds. For our three distinct institutional channels, only the

unitized channel exhibits statistically significant convexity due to the strong reaction of

inflows to favorable performance. However even for this channel, the observed

convexity is at a far lower level than for the direct and independently advised channels.

In short, then, convexity in the inflow-performance relation is primarily driven by

individuals investing either through independent advisors and to a lesser extent directly.

How different are the different channels in our dataset? The last six rows of Table III

report p-values for comparisons of inflow-performance parameters for adjacent columns

shed light on this question. Although the three institutional channels are structurally very

distinct, there is little evidence against equality of the flow-performance parameters for

these channels. As regards the retail channels, all three pairs have significantly different

inflow-performance sensitivities in the region of favorable performance, and two out of

three pairs display significantly different convexities. Overall, then, these results show

that if we were to group superficially similar investor types – i.e. the four retail

distribution channels, or even the three intermediated retail channels – we would have

pooled together investors with markedly different investment behaviors.[16]

Table III also shows how investor inflows are influenced by factors other than past

performance. Although initial fees are a useful control variable in isolating the impact of

other fund characteristics on performance, their coefficients (which range from highly

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[16] In a robustness test, we examine the effect of using geometric average fund returns in excess of
the geometric average FTSE All-Share market index return, with the latter as the point of
inflection. This change preserves the tenor of our results.

negatively to highly positively significant) are difficult to interpret across channels because these fees are often discounted or even waived. Such is not typically the case for annual fees. Investors across all retail advised channels invest more in funds with higher annual fees, which may be because these are associated with a higher level of service, a greater marketing effort or greater perceived fund quality. Retail investors investing more in funds with higher annual fees is a phenomenon which is consistent with Sirri and Tufano (1998) who conjecture that it is because the fees are spent on marketing thereby reducing investors' search costs. Institutional investors, however, view annual fees less favorably and respond accordingly with lower investment levels, which may be because they are less swayed by advertising. As our flows are scaled by fund size, it is unsurprising that funds that are younger, as measured by the logarithm of their age, and (in most cases) smaller, as measured by the logarithm of their TNA, generally benefit from greater inflows. We also control for the size of the fund family, measured as the logarithm of the number of funds the family has. Larger families attract lower per-fund flows via tied agent, private client and in-house insurance channels; this could be due to a perceived lack of focus for such funds. We also include a tracking error variable in our regressions and we find no evidence of institutional investors punishing tracking error, although private client and tied agent retail channel investors do. This is in contrast to Del Guercio and Tkac (2002) who show that while institutional investors punish managers who deviate from their benchmark with decreased flows, retail investors do not. Our regressions also show no evidence that any of our investor classes are influenced by fund-level timing ability.

The goodness-of-fit statistics contained in Table III indicate that in aggregate retail flows are easier to explain than aggregate institutional flows. Del Guercio and Tkac (2002) show that the explanatory power of their flow-performance regressions is lower for institutional flows than for retail flows and suggest that certain "difficult to measure" non-performance related manager characteristics might explain institutional flows. Our aggregate results are therefore akin to theirs. However, our more detailed data that permit us to look beyond the aggregate results, reveal a less clear-cut picture. The greater ability to explain retail flows in the data stems from the private client channel. Interestingly, however, the explanatory power for retail direct flows is considerably lower and fund purchases and sales by direct retail investors are in fact the hardest flows to explain across all retail and institutional categories. Likewise, the weak overall explanatory power in our aggregate institutional regressions does not carry over to all channels and is not the case for the in-house insurance channel. The picture painted by Del Guercio and Tkac (2002) is that of institutional flows always being more difficult to explain. This representation does not appear to hold when we look at more disaggregated data.

In further tests that we do not report for purposes of brevity, we re-run our flow-performance regressions except that we now divide up fund mean-adjusted returns into a Carhart four-factor alpha (α) component, reflecting stock selection ability, and the remaining $R-\alpha$ component, attributable to exposures to common factors in stock returns. Doing so allows us to understand the extent to which overall convexity is the result of convexity in α or $R-\alpha$ and thus whether fund inflows incentivize managers to take bets on individual stocks, common factors or both. It also sheds light on which performance

measures different investors use to make their buying and selling decisions. Since UK equity fund managers tend to specialize in stock picking rather than in factor timing, an investor who believes in the predictive power of past performance should react more strongly to alpha than to the non-risk-adjusted return.

Surprisingly, we find that fund inflows are convex in not only the alpha component of performance but also the non alpha part. This convexity means that, in expectation, investors reward fund managers for gambling not only on individual stocks, but also on common factors in stock returns. In other words, if a fund's exposure to a common factor is different from its peers' average exposure to that factor, then the fund's high inflows when the factor does well will more than compensate for its low inflows when the factor does poorly.

As regards which part of returns investors use to make their flow decisions, we find that in the majority of the channels that buying decisions do not discriminate between α or $R-\alpha$ performance. Only tied agent and private client investors pay significantly more attention to α than to $R-\alpha$ performance when making their inflow decisions. Since such behavior is consistent with paying active management fees (which, to a large extent, are meant to finance and reward stock selection activity), this suggests relative sophistication by investors buying funds through these channels. The beliefs of investors who react strongly to α and comparably to $R-\alpha$ (independently advised and pension fund) and those who react to neither (in-house insurance) are harder to reconcile with their commitment to active management.

IV. Fund Selling Behavior

In this section, we focus on ways in which investment performance prompts investors to sell mutual funds. Analogously to the previous section, we study non-linearities in the reaction of outflows to the mean-adjusted return.[17]

Consistent with our examination of inflow-performance convexity, we partition mean-adjusted performance into positive and negative regions; as the bottom panel of Figure II shows, this is a reasonable way to capture outflow-performance non-linearity in a parsimonious manner. Note also that, according to the graph, outflows tend to be convex with respect to fund performance. Of course, a convex outflow-performance relation impacts assets under management in a similar way to a concave inflow-performance relation.

[Table IV here]

Table IV shows what happens when we regress our outflow measure for each channel on performance in positive and negative performance ranges as well as the battery of control variables we used in the preceding section. As the literature leads us to expect, the reaction of outflows to performance is more muted than that of inflows and the reaction of outflows to fund performance is much stronger for below average performance than above (-53.66 vs. 2.86, p-value=0.002).

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[17] Ivkovic and Weisbenner (2009) suggest that taxes have an important impact on the behavior of outflows. In unreported results, we conduct regressions analogous to those of Ivkovic and Weisbenner, but find outflows not to be influenced by taxes in our sample. We therefore follow the same specification for our analyses of fund selling behavior as we did for buying behavior in the preceding section.

Clearly, outflows have the greatest impact on the overall flow-performance relationship when fund performance is poor. If we focus on this region of the outflow-performance relationship what do our results reveal? First, unlike for inflows, we do not see a significant difference between the reaction of retail outflows and institutional outflows to poor performance.

Second, if we look at individual channels, the relative strength of the outflow reaction to poor performance across channels mirrors broadly our inflows results. On the retail side, the fact that the independently advised channel reacts the most strongly to poor performance can be understood by the transaction-based incentives of advisers for this channel. Private client and tied agent advisors have little incentive to encourage investors to switch funds and hence, unsurprisingly, we see low flow sensitivity to performance for these channels. Like for inflows, direct investor outflows are sensitive to fund performance but not to the extent that they are for independently advised investors. On the institutional side, outflows via the pension fund channel react most strongly to poor performance, which is consistent with the incentives of pension fund consultants.

What contribution do outflows make to overall aggregate flow convexity? While in aggregate outflows increase as performance worsens at a faster rate when performance is below average than when it is above average, the magnitudes involved are quite a bit smaller than the corresponding magnitudes on the inflow side. Thus, in aggregate, outflows offset only a small portion of the convexity brought about by the inflow-performance relation. Looking at retail and institutional outflows, both are modestly

concave in mean-adjusted returns, with statistical significance near or below the 5 percent mark. Among individual channels, there is evidence of non-linearity only for the independently advised channel.

In a similar fashion to our inflow analysis, we also conduct further outflow analysis regressions partitioning performance on α and R–α components of performance. We find that investors display significant outflow non-linearity for both α and R–α performance which is driven by retail independently advised investors. Interestingly, the convexity in their outflow performance relationship for α stems from the strength of their reaction to poor performance, whereas their outflow convexity in R–α stems derives from their reaction to fund performance when performances lies above the cross-sectional average.

What about the relative weights that different types of investors put on alpha and non-alpha portions of performance when making their fund sale decisions? In the positive-performance region the difference is never significant, which is unsurprising given the low outflow-performance sensitivity for funds that did well. In the negative performance region, though, there are some intriguing results. Recall that on the inflow side, investors who put less weight on returns due to common factor exposures as compared to alphas were tied agent and direct ones. On the outflow side, such is the case for direct and independently advised investors, both of whom flee low-alpha funds but are undeterred when the non-alpha portion of performance is poor. Remarkably, selling via tied agents does the reverse: poor alpha is ignored, but poor non-alpha performance is punished. In

other words, when these investors buy funds, they are unswayed by returns due to common factor tilts, but do take them into account when performance has been poor as they consider selling. This discrepancy in the way buying and selling decisions are made once again highlights the importance of studying these decisions separately.

V. Discussion and conclusion

To date, work on the flow-performance relationship has focused on the average US investor and has found convexity in the aggregate flow-performance relationship. However there are a broad variety of fund trading channels. Some are for retail investors, some are for institutional investors and some involve advisors and others do not. Even within advised channels, the type of advice provided can vary from being transaction-based to being long-term where adviser remuneration is based on a fixed fee or is a function of assets under management.

In this paper we examine whether there are differences in the way different investors across distribution channels buy and sell mutual funds and whether the institutional features and the incentives of the parties involved in each channel have a bearing on these buy and sell decisions.

We show that there are significant differences across distribution channels in fund inflow and outflow behavior, which tells us that the mix of distribution channels can influence the aggregate flow-performance relationship. In addition, the incentives of the parties involved in each channel, especially the incentives of advisers, help to explain observed

flow sensitivities. Our findings also allow us to understand the origins of aggregate flow-performance convexity. We show that this stems from the strong reaction of aggregate retail inflows to favorable fund performance, and in particular to the way independently advised investors buy into funds. Interestingly, when we partition the investment return into its alpha-only non-alpha components, we show that not only do many categories make their buy and sell decisions on the basis of non-alpha performance but also that there is convexity in both the flow-alpha relationship as well as in the flow non-alpha relationship. This result means that both risk-taking with respect to specific stocks, and risk-taking with respect to common factors are rewarded with higher investor inflows.

In order to check on the robustness of our key findings, we perturb our empirical specifications in several ways. First, we extend our performance measures to three years preceding the money flow in place of the one year performance that underlies results reported throughout the paper. This actually increases the statistical significance of our findings, and suggests that by using one-year performance, we are being conservative in our conclusions. Second, we check on our conclusions regarding flow-performance convexity by including both a performance term and a performance-squared term, in place of a piecewise linear performance specification. We find that for every piecewise linear specification where the impact of the positive and negative portions of performance on flows is significantly different at the 0.05 level, the t-statistic of the performance-squared term in the corresponding quadratic specification is 2.5 or higher. This suggests that splitting performance into positive and negative portions adequately captures non-linearity in the flow-performance relation. Our use of the piecewise linear specification

is due to the greater ease with which the estimation results can be interpreted. Lastly, when disaggregating performance into its alpha and non-alpha components, we use the Fama-French three-factor alpha in place of the Carhart four-factor one. We find that the two sets of results are very close; in particular, all of the instances where convexity is significant using four-factor adjustment, are also significant under three-factor adjustment.

Our results have implications both for fund management companies, and for regulators. For fund management companies, they suggest which distribution channels should be favored given their funds' historical or anticipated performance. Further, the fact that for retail investors, especially for independently advised ones, inflow is convex even in the portion of performance unrelated to stock picking skill, suggests that these investors reward the creation of funds following opposing styles, since increased flows to winning styles will more than offset decreased flows to losing styles.

Our implications for regulators are both richer and more nuanced. Although current evidence points to the outperformance of passive management on average, and passive investing is accordingly gaining in popularity, regulators are careful not to discourage active mutual fund investing altogether, as this would leave out mutual funds from the set of players policing market efficiencies and delivering investment gains to their investors in the process. From the perspective of regulators, therefore, the best active fund investors are those who induce the most intense competition for superior performance among fund managers, i.e. those whose reaction to fund performance is especially strong.

At the same time, strong reaction to past performance tends to be convex, thus inducing excess risk-taking. It also tends to spill over into sensitivity to non-alpha performance, rewarding active fund managers for actions unrelated to stock-picking, which is the activity that justifies active fees in the first place. Weighing the pros and cons of these investor behaviors is not easy, and is well beyond the scope of this paper. Rather, by characterizing how the different investors behave, our results serve to illuminate the options that are on the regulators' menu.

Despite the gradual availability of improved mutual fund flow data, much remains to be learned about how different investor types and different intermediaries contribute to the way the fund management industry is evolving. Mandated changes to the way funds are distributed, such as those now afoot in the UK, will no doubt yield new insights. Another promising avenue for future research is to examine how mutual fund investors behave across countries.

References

Alexander, Gordon J., Jonathan D. Jones, and Peter J. Nigro, 1998, Mutual fund shareholders: Characteristics, investor knowledge, and sources of information, *Financial Services Review* 7, 301-316.

Barber, Brad M., Terrance Odean, and Lu Zheng, 2005, Out of sight, out of mind: The effects of expenses on mutual fund flows, *Journal of Business* 78(6), 2095-2119.

Berger, Allen N., J. David Cummins, and Mary A. Weiss, 1997, The coexistence of multiple distribution systems for financial services: The case of property-liability insurance, *Journal of Business* 70, 515-546.

Bergstresser, Daniel and James Poterba, 2002, Do after-tax returns affect mutual fund inflows?, *Journal of Financial Economics* 63, 381-414.

Bergstresser, Daniel, John M. R. Chalmers, and Peter Tufano, 2007, Assessing the costs and benefits of brokers in the mutual fund industry, *Review of Financial Studies*, forthcoming.

Boudoukh, Jacob, Matthew Richardson, Richard Stanton, and Robert F. Whitelaw, 2003, Valuing mutual fund companies, Working Paper, New York University.

Chevalier, Judith, and Glenn Ellison, 1997, Risk taking by mutual funds as a response to incentives, *Journal of Political Economy* 105, 1167-1200.

Christoffersen, Susan, Richard Evans, and David Musto, 2007, The economics of mutual fund brokerage: Evidence from the cross section of investment channels, Working Paper, McGill University.

Datamonitor, 2001, UK Independent Financial Advisors

Del Guercio, Diane, and Paula Tkac, 2002, The determinants of the flow of funds of managed portfolios: Mutual funds vs. pension funds, *Journal of Financial and Quantitative Analysis* 37, 523-557.

Dimson, Elroy, Stefan Nagel, and Garrett Quigley, 2003, Capturing the value premium in the UK 1955-2001, *Financial Analysts Journal* 59, 35-45.

Goetzmann, William N., and Nadav Peles, 1997, Cognitive dissonance and mutual fund investors, *Journal of Financial Research* 20, 145-158.

Gough, Orla, 2009, understanding what drives the purchase decision in pension and investment products, *Journal of Financial Services Marketing* 14, 152-172.

Grinblatt, Mark and Matti Keloharju, 2000, The investment behavior and performance of various investor types: a study of Finland's unique data set, *Journal of Financial Economics* 55, 43-67.

Gruber, Martin J., 1996, Another puzzle: The growth in actively managed mutual funds*, Journal of Finance* 51, 783-810.

Huang, Jennifer C., Kelsey D. Wey, and Hong Yan, 2007, Participation costs and the sensitivity of fund flows to past performance, *Journal of Finance* 62, 1273-1311.

Ippolito, Richard A., 1992, Consumer reaction to measures of poor quality: Evidence from the mutual fund industry, *Journal of Law and Economics* 35, 45-70.

Ivkovic, Zoran, and Scott Weisbenner, 2009, Individual investor mutual-fund flows, *Journal of Financial Economics*, forthcoming.

James, Christopher, and Jason Karceski, 2006, Investor monitoring and difference in mutual fund performance, *Journal of Banking and Finance* 30, 2787-2808.

Keswani, Aneel, and David Stolin, 2008, Which money is smart? Mutual fund buys and sells of individual and institutional investors, *Journal of Finance* 63, 85-118.

Lynch, Anthony W. and David K. Musto, 2003, How investors interpret past fund returns, *Journal of Finance*, 53, 2033-2058.

Nanda, Vikram, Z. Jay Wang, and Lu Zheng, 2004, Family values and the star phenomenon, *Review of Financial Studies* 17, 667-698.

O'Neal, Edward S., 2004, Purchase and redemption patterns of US equity mutual funds, *Financial Management*, Spring, 63-90.

Quigley, Garrett, and Rex A. Sinquefield, 2000, Performance of UK equity unit trusts, *Journal of Asset Management* 1, 72-92.

Sirri, Erik R., and Peter Tufano, 1998, Costly search and mutual fund flows, *Journal of Finance* 53, 1589-1621.

Table I. Properties of Monthly Money Flows

Panel A shows the distribution of raw and normalized monthly money flows and Panel B shows the correlation between normalized monthly money flows pooled across fund-months over the 1992-2001 period. The money flow types are coded as follows. F_DRCT: direct from public; F_ADVS: intermediated by an independent financial advisor; F_AGNT: intermediated by company sales force; F_PRIV: private client; F_UNIT: unit-linked insurance; F_INHS: in-house insurance; F_PENS: pensions; F_OTHR: unclassified; F_RETL: all retail flows (direct, intermediated, and private client); F_INST: all institutional flows (insurance and pensions); F_TOTL: all flows (retail and institutional). Normalized flows are raw flows scaled by fund value and then by the ratio of aggregate flow to aggregate fund value for that channel as described in the text. In Panel B, correlations below the diagonal refer to inflows and correlations above the diagonal to outflows. The last column of Panel B shows, for each flow type, the correlation between inflows and outflows.

Panel A: Distribution of monthly money flows

| | | Raw Flow | | | | Normalized Flow | | | |
| | | Inflow | | Outflow | | Inflow | | Outflow | |
Flow type	N	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
(1) F_DRCT	27287	202	782	278	847	1.51	6.01	1.41	3.76
(2) F_ADVS	26275	703	2633	432	1369	1.68	4.32	1.64	3.88
(3) F_AGNT	15550	815	3278	345	1388	1.24	3.56	0.94	2.14
(4) F_PRIV	7298	303	1166	143	457	2.23	7.47	2.27	7.97
(5) F_UNIT	12370	622	3388	493	6879	1.06	3.58	0.94	3.48
(6) F_INHS	6957	333	2105	405	2248	1.04	7.01	0.76	2.83
(7) F_PENS	12731	1013	4614	905	4692	0.81	2.79	0.82	3.07
(8) F_OTHR	3914	213	1548	273	2774	0.96	6.00	0.71	5.00
(9) F_RETL	30610	1270	3740	828	2031	1.67	3.25	1.57	2.69
(10) F_INST	21558	1102	4809	997	6848	0.94	2.88	0.89	2.84
(11) F_TOTL	31692	1976	5565	1478	6101	1.40	2.47	1.31	2.18

Panel B: Correlations between normalized monthly money flows

Flow type	F_DRCT	F_ADVS	F_AGNT	F_PRIV	F_UNIT	F_INHS	F_PENS	F_RETL	F_INST	F_TOTL	In/Out flow
F_DRCT		0.076	-0.029	-0.019	-0.007	-0.012	-0.006	0.518	-0.011	0.388	0.050
F_ADVS	0.180		0.069	0.046	0.065	0.015	0.162	0.816	0.095	0.656	0.033
F_AGNT	0.046	0.048		-0.013	0.084	0.035	0.073	0.409	0.061	0.277	0.158
F_PRIV	0.050	0.111	0.074		-0.009	-0.015	0.004	0.561	-0.004	0.443	0.035
F_UNIT	0.072	0.178	0.097	0.038		0.038	0.026	0.055	0.689	0.501	0.021
F_INHS	0.191	0.032	-0.004	-0.042	0.074		-0.023	-0.010	0.557	0.448	0.065
F_PENS	0.029	0.126	0.069	0.106	0.042	0.014		0.111	0.838	0.655	0.055
F_RETL	0.423	0.811	0.815	0.568	0.179	0.096	0.112		0.063	0.797	-0.001
F_INST	0.081	0.132	0.029	0.033	0.669	0.549	0.896	0.117		0.761	0.049
F_TOTL	0.375	0.716	0.670	0.499	0.558	0.412	0.651	0.869	0.718		-0.023

Table II. Fund Characteristics Weighted by Money Inflows

This table shows fund characteristics for different distribution channels. To calculate these numbers, fund-level attribute information are gathered for all funds serving a given channel each month. Monthly fund attribute information is based on the characteristics of the fund concerned that month. A weighted average of these statistics is then calculated using fund-level money inflows as weights to provide aggregate fund attributes by channel. Equally-weighted and value-weighted fund attributes are presented at the bottom of the table for purposes of comparison. Money flow types are coded as follows. F_DRCT: direct from public; F_ADVS: intermediated by an independent financial advisor; F_AGNT: intermediated by company sales force; F_PRIV: private client; F_UNIT: unit-linked insurance; F_INHS: in-house insurance; F_PENS: pensions; F_RETL: all retail flows (direct, intermediated, and private client); F_INST: all institutional flows (insurance and pensions); F_TOTL: all flows (retail and institutional). "Fund Size" is the TNA of the fund in £ million, "Initial Fee" and "Annual Fee" are the front load and annual charge, "Fund Age" is the number of years since fund launch, and "Family Size" is the number of U.K. open-end funds run by the fund management group.

| Weighted by | Fund Attributes | | | | |
	Fund Size	Initial Fee	Annual Fee	Fund Age	Family Size
F_DRCT	458.8	4.94	1.23	18.7	26.0
F_ADVS	464.9	4.85	1.29	15.3	26.7
F_AGNT	542.7	5.10	1.24	10.7	14.3
F_PRIV	255.7	4.77	1.20	15.7	20.3
F_UNIT	845.6	4.27	1.17	17.2	28.9
F_INHS	645.0	4.91	1.10	18.1	18.2
F_PENS	933.5	2.96	0.80	15.3	33.9
F_RETL	477.5	4.94	1.26	14.3	22.2
F_INST	858.7	3.66	0.96	16.5	30.7
F_TOTL	622.1	4.45	1.14	15.1	25.4
Unity	171.1	4.81	1.22	14.5	20.3
Fund Size	782.8	4.57	1.11	19.5	25.7

Table III. Non-linearity of the Inflow-Performance Relation

This table shows the results of regressing fund inflows for different distribution channels on investment performance measures over the 12-month period preceding the flow and an array of control variables. The money flow types are coded as follows. F_DRCT: direct from public; F_ADVS: intermediated by an independent financial advisor; F_AGNT: intermediated by company sales force; F_PRIV: private client; F_UNIT: unit-linked insurance; F_INHS: in-house insurance; F_PENS: pensions; F_RETL: all retail flows (direct, intermediated, and private client); F_INST: all institutional flows (insurance and pensions); F_TOTL: all flows (retail and institutional). Money flows are normalized, i.e. scaled by fund value and by the aggregate ratio of flows to fund value as described in the text. The explanatory variables are as follows. *R / R<0* equals the average mean-adjusted monthly return if this quantity is negative, and zero otherwise, while *R / R>0* equals the average mean-adjusted monthly return if this quantity is positive, and zero otherwise; returns are averaged over the 12-month period preceding the money flow. *Tracking* is the squared root of the monthly average squared difference between fund return and FTSE All Share return. *Timing* is the coefficient on the square of the excess market return when this variable is added to the regression of fund returns on the four Carhart (1997) factors. *InitialFee* and *AnnualFee* are the advertised front load and annual management charges. *FundSize*, *FundAge*, and *FamilySize* are, respectively, logarithms of the fund TNA, of its age, and of the number of funds in its family. The estimation is done using the Tobit model for each calendar month, with the flow variable censored from below at zero. The table reports average monthly coefficient estimates, followed by Newey-West adjusted t-statistics. Pseudo-R^2 is the squared correlation between non-zero flows and their predicted values. The last six rows display p-values of the stated hypothesis tests.
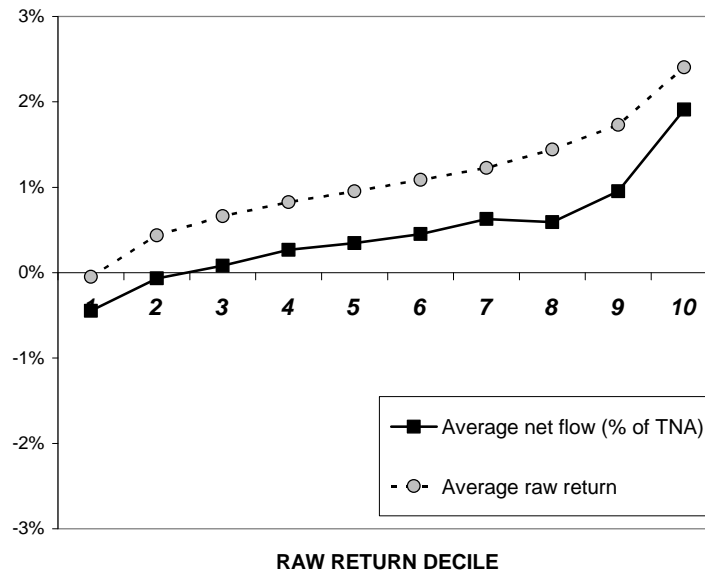
Explanatory Variable	Dependent variable									
	Retail Flows				Institutional Flows			Aggregate Flows		
	F_DRCT	F_ADVS	F_AGNT	F_PRIV	F_UNIT	F_INHS	F_PENS	F_RETL	F_INST	F_TOTL
intercept	5.18 4.6	3.52 6.0	2.50 3.4	25.57 4.5	2.07 2.7	5.86 2.6	4.84 5.5	3.49 6.4	2.89 5.4	2.18 5.4
R|R<0	15.75 1.1	33.53 1.8	43.95 2.5	114.62 2.3	13.38 0.9	-39.58 -1.1	41.67 2.9	46.26 3.9	25.79 2.6	39.10 4.6
R|R>0	200.69 7.5	378.73 7.7	37.60 1.6	288.67 2.7	102.52 4.2	55.24 1.2	78.32 4.6	244.13 9.1	91.75 5.2	186.98 8.7
Tracking	-7.79 -1.1	8.56 0.6	-20.64 -4.2	-108.93 -2.5	5.52 0.9	-6.59 -0.4	-0.02 0.0	-12.13 -1.3	5.39 0.9	-6.20 -0.9
Timing	0.00 0.0	0.02 0.5	0.05 1.5	0.08 0.5	-0.01 -0.3	0.11 1.5	0.00 0.2	0.02 0.6	0.01 0.5	0.02 1.0
InitialFee	3.39 1.1	-4.82 -1.4	-1.28 -0.4	-80.06 -2.9	9.68 1.1	21.37 2.4	-9.19 -5.2	-0.05 0.0	-7.33 -4.4	-1.97 -1.8
AnnualFee	-7.25 -0.5	50.23 4.7	63.57 2.5	71.58 2.4	12.90 0.7	-101.08 -2.1	-104.59 -7.0	71.22 5.4	-68.45 -6.3	19.51 2.1
FundSize	-0.18 -3.9	-0.10 -3.1	0.08 2.1	-0.89 -3.3	-0.02 -0.7	-0.11 -1.3	-0.09 -2.5	-0.07 -3.0	-0.01 -0.2	0.00 0.0
FundAge	-0.34 -4.6	-0.60 -9.5	-0.89 -8.7	-0.63 -3.8	-0.74 -10.2	-0.48 -2.2	-0.46 -5.2	-0.69 -10.1	-0.58 -9.8	-0.61 -10.3
FamilySize	0.01 0.1	0.03 0.3	-0.40 -10.2	-0.31 -1.4	0.10 1.1	-0.50 -2.6	0.14 1.9	-0.02 -0.7	0.20 3.3	0.10 2.9
N fund-months	23,396	22,585	13,813	6,379	10,991	6,443	10,970	26,025	18,820	26,936
Pseudo R^2	0.095	0.230	0.230	0.566	0.186	0.496	0.248	0.196	0.152	0.182
Hypothesis tests										
$\beta_{R\|R<0} = \beta_{R\|R>0}$	0.000	0.000	0.851	0.231	0.006	0.169	0.163	0.000	0.006	0.000
for adjacent columns:										
equal $\beta_{R\|R<0}$		0.424	0.666	0.187		0.192	0.038		0.207	
equal $\beta_{R\|R>0}$		0.000	0.000	0.026		0.395	0.614		0.000	
equal $\beta_{R\|R>0} - \beta_{R\|R<0}$		0.001	0.000	0.231		0.942	0.394		0.000	

Table IV. Non-linearity of the Outflow-Performance Relation

This table shows the results of regressing fund outflows for different distribution channels on investment performance measures over the 12-month period preceding the flow and an array of control variables. The money flow types are coded as follows. F_DRCT: direct from public; F_ADVS: intermediated by an independent financial advisor; F_AGNT: intermediated by company sales force; F_PRIV: private client; F_UNIT: unit-linked insurance; F_INHS: in-house insurance; F_PENS: pensions; F_RETL: all retail flows (direct, intermediated, and private client); F_INST: all institutional flows (insurance and pensions); F_TOTL: all flows (retail and institutional). Money flows are normalized, i.e. scaled by fund value and by the aggregate ratio of flows to fund value as described in the text. The explanatory variables are as follows. $R \mid R<0$ equals the average mean-adjusted monthly return if this quantity is negative, and zero otherwise, while $R \mid R>0$ equals the average mean-adjusted monthly return if this quantity is positive, and zero otherwise; returns are averaged over the 12-month period preceding the money flow. *Tracking, Timing, InitialFee, AnnualFee, FundSize, FundAge*, and *FamilySize* are as defined in Table III. The estimation is done using the Tobit model for each calendar month, with the flow variable censored from below at zero. The table reports average monthly coefficient estimates, followed by Newey-West adjusted t-statistics. Pseudo-R^2 is the squared correlation between non-zero flows and their predicted values. The last six rows display p-values of the stated hypothesis tests.
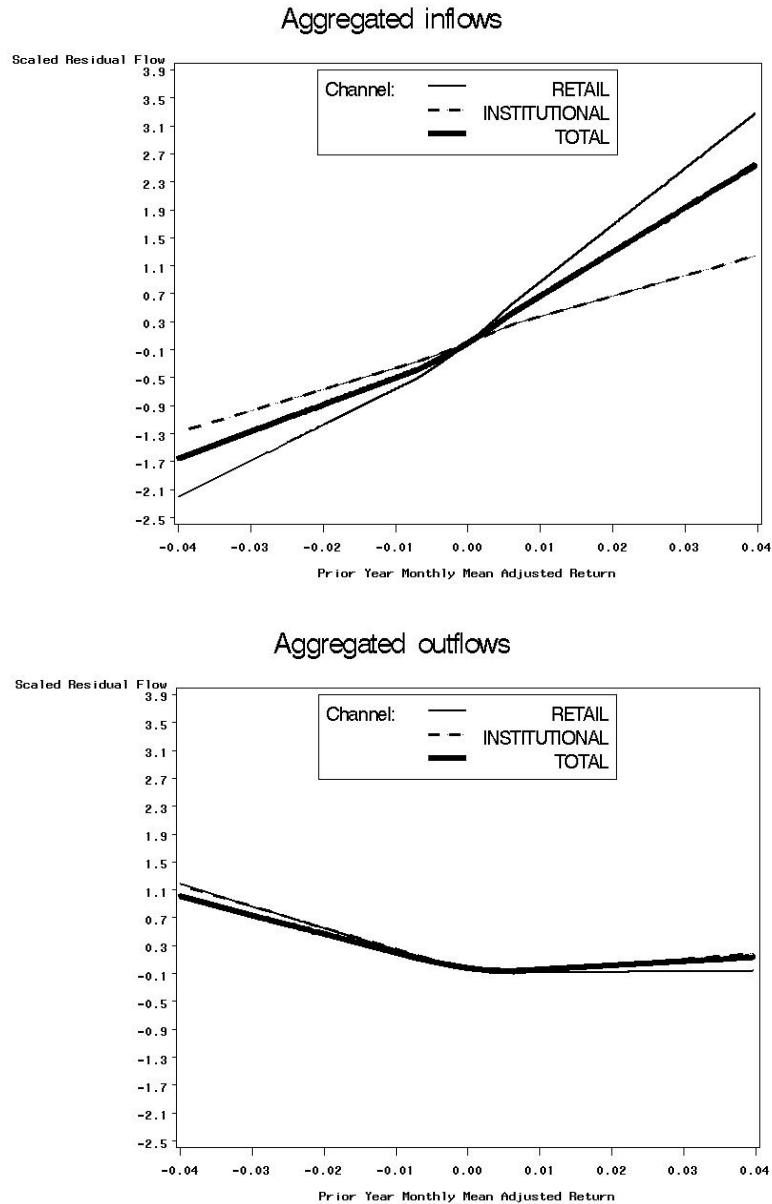
Explanatory Variable	Retail Flows				Institutional Flows			Aggregate Flows		
	F_DRCT	F_ADVS	F_AGNT	F_PRIV	F_UNIT	F_INHS	F_PENS	F_RETL	F_INST	F_TOTL
intercept	5.25 6.1	6.52 12.9	5.37 6.6	23.31 5.9	0.51 0.6	2.08 2.0	6.13 5.4	5.68 9.4	2.35 4.5	3.23 7.1
R	R<0	-70.13 -2.4	-95.86 -3.8	-8.53 -0.6	18.18 0.3	-24.49 -1.8	-25.77 -1.3	-37.70 -1.2	-59.34 -3.0	-47.39 -2.5	-53.66 -3.9
R	R>0	4.75 0.2	25.41 1.4	-18.10 -1.5	13.11 0.3	19.36 1.1	21.28 0.9	0.20 0.0	6.97 0.6	2.03 0.2	2.86 0.4
Tracking	11.81 2.1	41.03 5.1	-20.68 -6.0	2.56 0.2	5.12 0.9	2.09 0.2	15.71 2.1	17.85 3.9	12.99 2.9	16.97 5.0
Timing	-0.07 -1.7	-0.01 -0.5	0.07 3.0	0.05 0.4	0.02 0.4	-0.03 -0.5	-0.03 -0.9	-0.02 -1.3	-0.02 -0.8	-0.02 -1.2
InitialFee	15.71 5.0	-1.82 -0.6	-10.04 -1.6	-40.37 -3.2	5.69 1.2	5.51 0.8	-21.10 -5.3	3.38 1.6	-15.03 -6.0	-2.41 -2.0
AnnualFee	61.18 6.6	22.43 1.8	-40.21 -4.6	69.98 1.6	41.20 1.4	-32.32 -2.4	-138.20 -8.7	51.60 8.1	-64.62 -6.1	3.12 0.5
FundSize	-0.31 -6.6	-0.43 -16.3	-0.15 -3.9	-1.09 -5.8	0.01 0.3	-0.05 -1.3	-0.19 -3.4	-0.35 -9.7	-0.01 -0.5	-0.17 -5.9
FundAge	0.07 1.2	-0.04 -0.8	-0.17 -1.9	0.29 1.8	-0.36 -3.6	-0.17 -1.2	-0.16 -2.4	0.02 0.6	-0.28 -8.4	-0.06 -2.4
FamilySize	-0.12 -1.6	0.57 10.0	0.05 0.9	-0.36 -1.1	0.09 1.2	-0.01 -0.1	0.22 3.4	0.31 8.5	0.22 4.2	0.33 10.6
N fund-months	23,396	22,585	13,813	6,379	10,991	6,443	10,970	26,025	18,820	26,936
Pseudo R^2	0.120	0.142	0.160	0.420	0.177	0.396	0.273	0.129	0.128	0.111
Hypothesis tests										
$\beta_{R\mid R<0} = \beta_{R\mid R>0}$	0.060	0.001	0.691	0.962	0.068	0.146	0.393	0.010	0.064	0.002
for adjacent columns:										
equal $\beta_{R\mid R<0}$		0.259	0.027	0.537		0.939	0.450		0.709	
equal $\beta_{R\mid R>0}$		0.424	0.067	0.378		0.169	0.143		0.621	
equal $\beta_{R\mid R>0} - \beta_{R\mid R<0}$		0.252	0.001	0.965		0.930	0.868		0.611	

Figure I. Returns and Flows by Return Decile in the U.K.

Note: We rank funds by average monthly raw return decile over the previous 12 months. For each decile, we plot the average ratio of net flow to fund size, and the average monthly raw return. Data are for 1992-2001.

Figure II. Mutual Fund Money Flows and Mean-Adjusted Returns

Aggregated inflows

Aggregated outflows

Note: Ordinary least squares is first used to regress scaled fund flow by channel on a set of explanatory variables excluding past performance. Variables used include fund size, fund age and the number of funds in the fund family (all in log form), fund initial and annual fee, and calendar year dummies. The resulting by-channel flow residuals are then related to fund mean-adjusted returns using local polynomial regression with a tri-cube weighting system to estimate predicted values of residual scaled flow. These predicted values of residual scaled fund flow are plotted against the previous year's fund mean-adjusted return for retail, institutional, and total channel aggregates.