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Are there disadvantaged clienteles in mutual funds?

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Abstract

This paper studies the flow-performance relationship of three different investor groups in mutual funds: Households, financial corporations, and insurance companies and pension funds, establishing the following findings: Financial corporations have a strong tendency to chase past performance and also hold an increased share in the top performing funds. Insurance companies and pension funds show some evidence of performance chasing, but are underrepresented in the best performing funds. Households chase performance, but they are also subject to status quo bias in their flows. Regarding investor composition the worst performing funds show no significant difference in their investor structure when compared to funds with average performance.

Keywords: Mutual Funds, Flow-Performance Relationship, Clientele

JEL: G11, G20, G23

Non-technical summary

Mutual fund investors chase past performance, even though performance is not persistent over time. This means that investors buy mutual funds that had a high return in the past. On the other hand, investors are reluctant to withdraw their money from the worst performing funds. This behavior has often been attributed to the irrationality of mutual fund investors, but there are also rational explanations for this investor behavior, such as the model of Berk and Green (2004).

The rational explanation by Berk and Green states that sophisticated investors chase performance in order to find managerial ability. But since managerial ability has decreasing economies of scale, fund performance deteriorates when inflows occur. This explains why it is rational to chase past performance even though performance is not persistent. The fact that some investors do not withdraw their money is explained by "disadvantaged clienteles" in mutual funds, i.e. investors who are unwilling or hindered by restrictions to follow a performance chasing strategy.

This paper investigates whether there are such disadvantaged clienteles in mutual funds. A unique data set, the Securities Deposits Statistics of the Deutsche Bundesbank, allows me to differentiate not only between retail and institutional investors, but also between different institutional investors such as financial corporations as well as insurance companies and pension funds. These investor groups are likely to differ in their behavior when buying and selling mutual fund shares. The main findings of this paper are as follows: First, financial corporations show a strong tendency to chase past performance. Second, there is some evidence that insurance corporations and pension funds chase performance, although not as strongly as financial corporations. Furthermore, insurance companies and pension funds do not invest in all mutual funds in the sample. Insurance companies and pension funds tend to invest in larger, older and less volatile funds, which results in the fact that insurance companies and pension funds hold only a lower fraction in the top performing funds. The difference between the two institutional investor groups can be explained by additional regulations for insurance companies and pension funds, which makes these investors institutionally disadvantaged. Third, evidence for retail investors is mixed. Households chase past winners to some extent, but compared to financial corporations the inflows to top performing funds are considerably smaller in size. Furthermore, retail flows show a significant first-order autocorrelation, while institutional investors do not. This autocorrelation pattern in retail flows can be caused by advertising of the funds, savings plans or by status quo bias of the investors. Both flows due to advertising and status quo bias are associated with unsophisticated investors or disadvantaged investors.

These results are consistent with the Berk-Green model. In particular the result that institutional investors chase past performance is of interest, since performance chasing is mostly associated with uneducated or irrational investors. Finally, the paper investigates whether investor groups differ in their behavior of punishing mutual fund managers by withdrawing their money from poorly performing funds. There is no clear evidence that one investor group punishes poor performance more than the other group.

Nichttechnische Zusammenfassung

Im Bereich der Investmentfonds lassen sich starke Mittelzuflüsse bei denjenigen Fonds feststellen, die in der Vergangenheit überdurchschnittlich abgeschnitten haben. Dieses Verhalten, bei dem sich Investoren an vergangener Performance eines Fonds orientieren, wird in der Literatur als "Performance Chasing" bezeichnet. Überraschend ist hierbei, dass es zu Performance Chasing kommt, obwohl gute Performance von Investmentfonds meistens nicht lange anhält. Im Gegensatz dazu kann man beobachten, dass Investoren nicht ihr Geld von schlechten Fonds abzuziehen. Diese Verhaltensweise von Investoren wird oft als irrational bezeichnet.

Berk und Green (2004) zeigen jedoch, dass es auch eine rationale Erklärung für Performance Chasing geben kann. Im Modellrahmen von Berk und Green verfolgen Investoren eine Performance-Chasing-Strategie, um fähige Fondsmanager, d.h. Manager die eine Überrendite generieren, zu finden. Mit wachsender Größe des Fonds, d.h. bei starken Fondszuflüssen, nimmt allerdings die Fähigkeit des Fondsmanagers den Markt zu schlagen ab. Starke Mittelzuflüsse reduzieren die Überrendite eines Fonds solange, bis der Fonds nicht mehr den Markt schlägt. Dies erklärt, warum Performance Chasing rational sein kann, auch wenn kein Fonds langfristig eine Überrendite erzielen kann. Die Tatsache, dass es nur wenig Abflüsse aus schlechten Fonds gibt, erklärt das Berk-Green-Modell durch sogenannte "benachteiligte Investoren", die entweder nicht rational sind, oder durch äußere Gegebenheiten oder Regulierungen gehindert werden ihre Mittel abzuziehen. Dieser Aufsatz untersucht, ob solche benachteilige Investorengruppen in Fonds existieren. Die Depotstatistik der Deutschen Bundesbank erlaubt hierbei nicht nur eine Unterscheidung zwischen privaten und institutionellen Investoren, sondern auch zwischen verschiedenen Typen innerhalb der institutionellen Investoren (beispielsweise Finanzinstitute sowie Versicherungen und Pensionskassen). Für diese Investorengruppen ist jeweils ein unterschiedliches Verhalten in Bezug auf die Kauf- und Verkaufsentscheidung von Fonds zu erwarten.

Die Ergebnisse lassen sich folgendermaßen zusammenfassen: Erstens, Finanzinstitute betreiben eine klare Performance-Chasing-Strategie. Zweitens kann festgestellt werden, dass auch Versicherungen und Pensionskassen eine Performance-Chasing-Strategie verfolgen, diese aber weniger ausgeprägt ist als bei Finanzinstituten. Des Weiteren investieren Versicherungen und Pensionskassen nicht in alle Investmentfonds. Sie bevorzugen größere und ältere Fonds, sowie Fonds mit geringerer Volatilität. Dies führt dazu, dass Versicherungen und Pensionskassen nur einen geringen Anteil an den besten Fonds halten. Die Unterschiede zwischen diesen beiden institutionellen Anlegergruppen können durch die zusätzliche Regulierung von Versicherung und Pensionskassen erklärt werden, die als "institutionelle Benachteiligung" bezeichnet werden kann. Die Ergebnisse bezüglich

privater Haushalte sind uneinheitlich. Auch in dieser Investorengruppe kann Performance Chasing festgestellt werden, allerdings in einem wesentlich geringeren Umfang als bei institutionellen Investoren. Außerdem kann eine beträchtliche Autokorrelation in den Fondsflüssen der Haushalte beobachtet werden, was bei institutionellen Investoren nicht der Fall ist. Autokorrelation in Fondsflüssen kann auf Werbung der Fonds, bestehende Sparpläne oder Status-Quo-Bias der Investoren zurückgeführt werden. Fondsflüsse aufgrund von Werbung und Status-Quo-Bias werden eher irrationalen Investoren bzw. benachteiligten Investoren zugerechnet.

Diese Ergebnisse sind konsistent mit dem Berk-Green-Modell. Hervorzuheben ist das Ergebnis, dass institutionelle Investoren Performance Chasing betreiben. Dieses Verhalten ist bislang in der Literatur eher unerfahrenen bzw. irrationalen Investoren zugeschrieben worden. In diesem Artikel wird zudem untersucht, ob sich die Investorengruppen in ihrem Verhalten, schlechte Performance durch Abflüsse zu sanktionieren, unterscheiden. Ein signifikanter Unterschied zwischen den Investorengruppen kann hier jedoch nicht festgestellt werden.

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1 Introduction

Mutual fund investors chase past performance, even though performance is not persistent over time. On the other hand, investors are reluctant to withdraw their money from the worst performing funds (see e.g. Sirri & Tufano 1998, Carhart 1997). This behavior has often been attributed to the irrationality of mutual fund investors.

In contrast to behavioral explanations, Gruber (1996) and Berk & Green (2004) develop a model in which investors rationally chase past performance. They assume that fund managers possess different levels of investment ability. Mutual funds' future performance is thus partly predictable from past performance. Sophisticated investors realize this and therefore rationally chase past performance. Since managerial ability is assumed to have decreasing returns to scale, a well performing manager will attract inflows until he or she is no longer able to outperform the market. By the same mechanism investors leave poorly performing funds up to the point where the funds cease to underperform. Thus, performance of mutual funds is not persistent, precisely because investors chase past performance.

The worst performing mutual funds, however, keep performing poorly (see Carhart 1997). Arguing in the framework of Gruber (1996) and Berk & Green (2004) the persistence of the worst performing funds is caused by the fact that some investors are unwilling or hindered from withdrawing their money (see Berk & Tonks 2007). This cannot be corrected by other investors, since they cannot short-sell mutual fund shares. The persistence of the worst performing funds is therefore attributed to unsophisticated or disadvantaged investor clienteles that do not withdraw their money from poorly performing funds. So are there disadvantaged clienteles in mutual funds, and if so, who are they?

Using a unique data set, that allows the identification of different investor groups in mutual funds, this paper tries to address this question. The data set comes from the Securities Deposits Statistics of the Deutsche Bundesbank, which record the depositors of securities held in Germany. Through this information I am able to obtain the investor

structure of mutual funds. In particular, the data enables me to differentiate not only between retail and institutional investors, but also between different institutional investors such as financial corporations and insurance companies and pension funds. These investor groups are likely to differ in their behavior. Financial corporations are arguably the most sophisticated investors and should invest according to performance. The group of private investors can include both sophisticated investors and unsophisticated investors. Insurance companies and pension funds are financially sophisticated, but can be institutionally disadvantaged because of regulatory restrictions. By identifying these three investor groups and analyzing their behavior within the same mutual fund I am able to directly test hypotheses deduced from the Gruber (1996) and Berk & Green (2004) model.

The main findings of this paper are as follows: First, financial corporations show a strong tendency to chase past performance, which is statistically and economically significant. The best performing funds experience inflows of up to 31 percentage points higher than the average fund. Consequently, the percentage of mutual fund shares held by financial corporations is higher for the best performing funds than for the average fund. While financial corporations hold an average of 13 percent in mutual funds, they hold about 18-19 percent in the best performing funds. The fact that financial corporations chase past performance is telling, because financial corporations are probably the most sophisticated investors and chasing past returns of mutual funds has often been attributed to unsophisticated investors. Thus, the finding that sophisticated investors chase performance provides strong support for the theory proposed by Gruber (1996) and Berk & Green (2004).

Second, there is some evidence that insurance corporations and pension funds are chasing performance, although not as strongly as financial corporations. Moreover, insurance companies and pension funds do not invest in all mutual funds in the sample. Insurance companies and pension funds tend to invest in larger and older funds, funds with high fees and less volatility, which results in the fact that insurance companies and pension

funds only hold around 10-12 percent of shares in the top performing funds, while the average share of this investor group is around 16 percent.

Third, evidence for retail investors is mixed. Households chase past winners to some extent, but compared to financial corporations the inflows to top performing funds are considerably smaller in size. Top mutual funds only experience around 3 percentage point higher inflows than the average fund. Furthermore, retail flows show a significant first-order autocorrelation, while both institutional investors - financial corporations, and insurance companies and pension funds - do not. This result is robust for all specifications and economically meaningful. All other things being equal, a fund that experienced an increase in retail flows of 10 percentage points in the previous quarter grows in the current quarter by an additional 2.6 percentage points. This autocorrelation pattern in retail flows can either be caused by unobserved fund characteristics, such as advertising and distribution channels, savings plans or by status quo bias. Both flows due to advertising and status quo bias are associated with unsophisticated investors.

Finally, the paper investigates whether investor groups differ in their behavior of punishing mutual fund managers by withdrawing their money from poorly performing funds. There is some evidence that financial corporations punish the worst performing funds by withdrawing their money. However, when looking at the percentage shares held by the investor groups, the investor composition of the worst performing funds does not systematically differ from the investor composition of the average fund.

The remainder of the paper is structured as follows. Section 2 reviews the related literature and develops the testable hypotheses. Section 3 describes the data set that is used. Section 4 investigates the differences in the flow-performance relationship of the various investor groups. Section 5 analyzes the investor composition subject to performance. Section 6 concludes.

2 Related Literature and Hypotheses

A wealth of literature investigates the flows of mutual fund investors as a response to past performance. This flow-performance relationship of investors in mutual funds has been found to be convex (e.g. Ippolito 1992, Chevalier & Ellison 1997, Sirri & Tufano 1998): mutual funds with high performance receive overproportional inflows, while funds with low performance experience only mild outflows. Ber, Kempf & Ruenzi (2007) and Jank & Wedow (2010) confirm this convex flow-performance relationship for the German mutual fund market.

There are several studies that investigate the flow-performance relationship of mutual funds in connection with investor heterogeneity. Christoffersen & Musto (2002) find heterogeneity among money market fund investors. On the one hand there is a group of investors that is responsive to performance; on the other there are investors that do not respond to bad performance by withdrawing their money. Investor heterogeneity can therefore explain the cross-sectional fee dispersion among money market funds.

There is also evidence for investor heterogeneity in equity funds. Del Guercio & Tkac (2002) find different flow-performance relationships among mutual and pension funds. James & Karceski (2006) observe differences between investors in institutional and retail funds and Chen, Yao & Yu (2007) find differences between the clientele of funds issued by insurance and non-insurance companies. This paper contributes to the literature of investor heterogeneity in mutual funds by directly analyzing the flow-performance relationship of various investor groups within the same fund.

The main focus of this paper thus lies in testing a theory put forth by Gruber (1996) and Berk & Green (2004). In their model they assume that mutual fund managers possess different investment abilities. Since mutual funds sell at net asset value, managerial ability is not priced. A mutual fund with high management ability is therefore underpriced. Sophisticated investors will realize this fact and buy (underpriced) well performing funds and leave underperforming funds, while disadvantaged or unsophisticated investors stay

behind. In the Berk & Green (2004) model managerial ability is subject to decreasing economies of scale (see Chen et al. 2004). Thus, inflows of sophisticated investors into top performing funds continue until the size of the fund has increased up to the point where the mutual fund manager is not expected to outperform the market. The first testable hypothesis, as formulated by Gruber, is therefore:

Hypothesis 1: Sophisticated investors constitute a larger percentage of cash flows into and out of mutual funds than disadvantaged investors.

If sophisticated investors identify skilled fund managers faster than unsophisticated investors and also leave poorly performing funds faster, this should also affect the stock of funds held by the investor groups. The second testable hypothesis is therefore about the percentage shares held by the different investor groups. If sophisticated investors exit poorly performing funds first, it will mostly be disadvantaged investors who stay behind. This is what Berk & Tonks (2007) call a "burnout" in analogy to the mortgage backed securities market. By the same argument the share of sophisticated investors will increase in the funds that overperform. Thus, the second testable hypothesis is twofold (Gruber 1996):

Hypothesis 2a: Mutual funds that overperform contain a larger proportion of sophisticated clientele than a fund with average performance.

Hypothesis 2b: Mutual funds that underperform contain a larger proportion of disadvantaged clientele than a fund with average performance.

This gives rise to the following question: Which groups in a mutual fund are sophisticated, unsophisticated or disadvantaged? Gruber (1996) proposes the following categorization, where mutual fund investors are divided into *sophisticated* and *disadvantaged investors*. Sophisticated investors are defined as investors who invest according to performance. The group of disadvantaged investors consists of the following sub-groups:

First, there are *unsophisticated investors*, who are influenced by other factors besides performance, such as advertising or brokerage advice. Second, there are *institutionally disadvantaged investors*, who are restricted in their investment decisions by regulations.[1]

This study will test these key hypotheses by investigating the flow-performance relationship and percentage holdings of three different investor groups: Households, financial corporations, and insurance companies and pension funds. If the theory by Gruber (1996) and Berk & Green (2004) is correct, we should expect differences in the investor groups' flow-performance sensitivities. Financial corporations are arguably the most sophisticated investors and should therefore have a strong flow-performance sensitivity, i.e. they should strongly chase performance and also heavily punish the worst performing funds by withdrawing money. The degree of financial sophistication for households is unclear a priori. Insurance companies and pension funds are financially sophisticated but compared to other institutional investors they are disadvantaged, because regulations restrict what they are able to invest in. In Germany insurance companies and pension funds are both regulated by the same law, the Insurance Supervision Act (Versicherungsaufsichtsgesetz, VAG), and are supervised by the Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, BaFin). This regulation requires insurance companies and pension funds to verify that their investments in mutual funds comply with prudent-man principles. The three investor groups consequently differ in their decisions whether to buy and sell mutual fund shares. The following section will describe the data set used in this study.

[1]Furthermore, Gruber names tax disadvantaged investors, for whom the tax considerations make it inefficient to redeem their shares from a fund. The complication of the tax overhang caused by capital gains tax (see e.g. Barclay et al. 1998) does not apply for Germany.

3 Data

3.1 Mutual Fund Data and Depositor Structure

The sample consists of mutual funds that are registered in Germany and are thus required to report to the central bank, the Deutsche Bundesbank.[2] The reporting data is the main data set and contains, among other things information about the numbers of shares outstanding, total net assets, buy and sell prices and dividends payed. The data set also includes funds that have either ceased to exist or have merged with other funds and is therefore survivorship-bias free. I only consider actively managed mutual funds that are primarily offered to individuals, i.e. I omit index funds and funds that are exclusively for institutional investors. To make funds comparable I only consider funds with a sufficient number of funds in their peer group:[3] funds that invest in Germany, Europe and funds with a global investment objective. The information about the investment objective as well as the total expense ratio was obtained from the German Federal Association of Investment Companies (Bundesverband Deutscher Investmentgesellschaften, BVI).

The mutual fund data is matched with data from the Securities Deposits Statistics of the Deutsche Bundesbank. Starting with the last quarter of 2005 the Securities Deposits Statistics record data on the depositor structure of financial securities held in Germany. The statistics give the amount of shares held by a certain depositor group in a financial security or, in this case, in a mutual fund. I investigate three major investor groups: Households, financial corporations, and insurance corporations and pension funds. Financial corporations include credit institutions, other financial intermediaries such as investment funds and financial auxiliaries and exclude insurance corporations and pen-

[2]There are a number of funds that are registered in Luxembourg and marketed in Germany. These funds do not report to the Deutsche Bundesbank and are therefore not contained in the sample.

[3]I omit index funds, sector funds and foreign single-country funds.

sion funds.[4] For simplicity, the term financial corporations will always exclude insurance companies and pension funds in the following analysis.

The Securities Deposits Statistics collect data from financial institutions in Germany on the basis of a security-by-security reporting system. Financial institutions report the number of shares of their customers or their own holdings in a mutual fund. These shares are categorized into depositor groups by the financial institutions and then reported to the Deutsche Bundesbank, which aggregates the data for each fund. Deviations between the actual number of shares outstanding and the number of shares reported can either be caused by shares that are held by depositors which are not reported (e.g. foreign shareholders) or by double counting. For this reason I cross-check the aggregate number of shares from the deposits statistics with the number of shares outstanding. Descriptive statistics for the sample can be found in Table 1.

The table provides the number of funds in the sample and their investment objective (Germany, Europe or Global). In addition it displays statistics of common mutual fund characteristics. Finally, the table shows the number of funds for which information on the investor structure is available. Coverage of the investor structure is around 60 to 70 percent for 2005 and 2006, but improved to around 90 percent for the years 2007 and 2008. Households hold the majority of assets, but their share decreased from 71 percent in 2005 to around 58 percent at the end of 2008. We see a growing importance of institutional investors in mutual funds. Especially the group of insurance companies and pension funds increased their value-weighted shares from 13 in 2005 to 22 in 2008. This increase might reflect the fact that since the reform of the statutory pension insurance scheme in Germany in-company and private pension schemes are becoming more and more important.

[4]Categorization according to the European System of Accounts (ESA 95): Households (ESA 95 code: S.14), insurance corporations and pension funds (ESA 95 code: S.125), financial corporations include credit institutions, other financial intermediaries and financial auxiliaries (ESA 95 code: S.122, S.123 and S.124). The remaining group includes non-financial corporations, central banks, general government, and nonprofit institutions serving households (ESA 95 code: S.11, S.121, S.13 and S.15). For further details see European Commission (1996) and Deutsche Bundesbank (2006).

3.2 Fund Flows

Since the data provides the number of shares being held by every investor group in each quarter, the calculation of investor flows is straightforward. The net flow of depositor group j in fund i in period t is calculated as follows:

$$Flow_{i,j,t} = \frac{Shares_{i,j,t} - Shares_{i,j,t-1}}{Shares_{i,j,t-1}}, \tag{1}$$

where $Shares_{i,j,t}$ is the amount of shares of fund i held by depositor group j in quarter t. The total net flow is simply calculated as the relative change in all outstanding shares. Through this procedure I obtain total net flows and flows for each of the three investor groups: Households, financial corporations, and insurance companies and pension funds.

Unusual flows can occur for very new funds, when mergers take place or when a fund closes down. To avoid these outliers I omit observations with a growth rate below and above the 1st and the 99th percentile.

Following Keswani & Stolin (2008) I calculate time series averages of mean, standard deviation and percentiles of all investor group flows, which can be found in Table 2. Overall, there are weak outflows from mutual funds in the sample period. While households seem to withdraw money from mutual funds in the sample period, financial corporations, and insurance companies and pension funds bought mutual fund shares. Furthermore, the cross-sectional variance of institutional flows is much larger than the variance of private investors. In particular, financial corporations show the highest variation. This high variation of institutional flows suggests that institutional investors move their money more quickly into and out of mutual funds than retail investors do.

Table 3 shows time series averages of pairwise correlations of investor group flows. The average correlation between the flows of the different groups is surprisingly small. Keswani & Stolin (2008) find a similarly low correlation between retail and institutional investors. This low correlation points to the fact that different investor groups behave very differently when deciding whether to buy and sell funds.

3.3 Performance Measures

Performance is estimated using three measures, which are commonly reported for mutual funds: Raw Return, Sharpe Ratio and Jensen's Alpha. Raw Returns are calculated assuming that gross dividends are reinvested immediately. I calculate the Sharpe Ratio as the average excess return in the evaluation period divided by the variance of returns (Sharpe 1966):

$$Sharpe\ Ratio_i = \frac{\overline{R_i - R^f}}{\sqrt{Var(R_i)}}, \tag{2}$$

where R_i is the monthly return of fund i and R^f the risk free rate measured by the 1-month EURIBOR. Last, I use the performance measure proposed by Jensen (1968). Jensen's Alpha is estimated as follows:

$$R_i - R^f = \alpha_i + \beta_i(R^m - R^f), \tag{3}$$

where R_i is again the return of fund i and R^f the risk free rate, again measured by the 1-month EURIBOR, and R^m is the return of the market portfolio. The market portfolio return is measured by the benchmark index for each investment objective. I use the following three benchmark indices, which are generally used to evaluate these mutual funds in their respective peer group: the MSCI Germany, MSCI Europe and MSCI Global Index. The evaluation period for the performance measures is 24 months. Using shorter or longer evaluation periods, such as 12 and 36 months, leads to similar results.

This study focuses on these performance measures, because they are easily available for all investors. Information services such as Morningstar and others provide these on a regular basis. The performance measures provided can therefore be seen as a signal of managerial ability, which is available to *all* investors, institutional and private, at no or only negligible costs. Thus, the focus of this paper is to answer the question of how investors react to these observed performance measures by adjusting their flows.

4 Flow-Performance Relationship

4.1 Flow-Performance Relationship of Different Investor Groups

In order to estimate the flow-performance relationship I run a piecewise-linear regression (see Sirri & Tufano 1998, Huang et al. 2007). For each quarter mutual funds are ranked within their investment objective according to their past performance, where performance is measured by Raw Return, Sharpe Ratio and Jensen's Alpha over the past 24 months. This rank is then normalized so that ranks are evenly distributed between zero and one, where zero is assigned to the worst performing fund and one to the best performing fund. Funds are then categorized into low, medium and high performing funds: low performing funds include the lowest performance quintile, medium performing funds the three middle performance quintiles and the high performing funds the highest performance quintile. The three variables for the regression are defined in the following way:

$$\begin{aligned} Low_i &= Min(Rank_i, 0.20) \\ Mid_i &= Min(Rank_i - Low_i, 0.60) \\ High_i &= Rank_i - Mid_i - Low_i, \end{aligned} \tag{4}$$

where $Rank_i$ is the percentile rank of the fund. Thus, the coefficients of Low, Mid and $High$ represent the piecewise decomposition of the percentile rank and can be interpreted as the slope of the flow-performance relationship within the performance range. The regression model is specified as follows:

$$\begin{aligned} Flow_{i,j,t} = \quad \beta_0 \quad &+ \beta_1 Low_{i,t-1} + \ \beta_2 Mid_{i,t-1} + \beta_3 High_{i,t-1} \\ &+ \beta_4 Controls_{i,t-1} + \varepsilon_{i,j,t}, \end{aligned} \tag{5}$$

where $Flow_{i,j,t}$ is the flow of each investor group j in fund i at quarter t. Control variables include volatility measured by the 24-month standard deviation of monthly

returns, total expenses, fund size measured by the natural logarithm of total net assets, and fund age measured by the natural logarithm of one plus age in years.[5] For each investor group I also include the flow lagged by one quarter into the regression, since mutual fund flows show a pattern of autocorrelation. In addition, the regression includes time dummies and dummies for the investment objectives, which are not reported.

The quarterly regression model is estimated using pooled OLS, since the sample's time dimension is quite short and the Fama & MacBeth (1973) regression lacks sufficient statistical power in such a setting. Standard errors are clustered at the fund level.

Table 4 shows the result of this regression for Raw Return, Sharpe Ratio and Jensen's Alpha. For all performance measures I find a convex flow-performance relationship in total net flows as can be seen in the first column of Panel A, B and C. Furthermore, the results show significant first-order autocorrelation in mutual fund flows. The remaining control variables show the expected signs. Volatility in returns is negatively related to fund flows, even though only significant in one specification and total fees are also negatively related to flows. Size and age have no significant influence on flows at the aggregate level. These findings are comparable to those for the US market (see e.g. Sirri & Tufano 1998, Chen et al. 2007, Huang et al. 2007).

Looking at the disaggregate flows, however, the three investor groups show pronounced differences in their flow-performance relationship in the high segment. Financial corporations have the highest flow-performance sensitivity in this segment. The top performing funds experience a 31 percentage point higher growth rate than funds in the middle section (See Panel B). There is some evidence that the group of insurance companies and pension funds chases past performance, but the coefficient of the high segment is not statistically significant for all performance measures. Moreover, households chase past performance, although, the coefficient is much smaller in size.

[5]Total expenses are measured by expense ratio + 1/3 total load. Since the average holding period was 2 - 3 years in the sample I adjust the calculation of total fees as proposed by Sirri & Tufano (1998). Note that Barber et al. (2005) find similar results for US mutual funds with an average holding period of 30 months in the late 1990s.

The first-order autocorrelation of investor flows is also of interest. The positive autocorrelation found in the aggregate net flows of mutual funds can solely be attributed to the group of households. Insurance companies and pension funds show no significant autocorrelation and financial corporations show a slightly negative coefficient of lagged flows, which, however, is only significantly different from zero at a ten percent level. This result is robust for all specifications and economically meaningful. All other things being equal, a fund that experienced an increase in retail flows of 10 percentage points in the previous quarter grows in the current quarter by an additional 2.6 percentage points. The autocorrelation in retail flows can be explained by unobserved factors such as distribution channels of the fund family, advertising or simply status quo bias (see e.g. Patel et al. 1991, Goetzmann & Peles 1997, Kempf & Ruenzi 2006). Thus, the autocorrelation of retail flows is a sign for unsophisticated investors among the group of retail investors. An alternative explanation is that retail investors are disadvantaged through high transaction costs, and thus choose to invest continuously in the same fund (e.g. through a savings plan).

The convex flow-performance relationship in total flows can be seen by the fact that withdrawals in the low performance segment are not as strong as performance chasing in the high performance segment. In addition, when comparing the three investor groups, differences in flow-performance sensitivity in the low performance segment are not as pronounced as for the high performance segment. Only financial corporations show significant outflows from the worst performing funds, when using risk adjusted performance measures. These findings have to be interpreted with caution since the flows of institutional investors show a high variation and these results might be driven by rather extreme flows.

In summary, the results mainly support the first hypothesis. Sophisticated investors account for a larger percentage of cash flows into well performing funds than disadvantaged investors do. Financial corporations, arguably the most sophisticated investors, chase past performance to the greatest extent. Insurance companies and pension funds, a group of

investors that might be institutionally disadvantaged, show a lower tendency to chase past performance. The results of households as a group are mixed. On the one hand they seem to be sophisticated, on the other hand some flows seem to be driven by advertising or status quo bias. This result is in line with Malloy & Zhu (2004), who find clientele differences among retail investors. There is some evidence that financial corporations punish poor performance by withdrawing their money from low performing funds.

As we see in Table 4, insurance companies and pension funds do not invest in all mutual funds of the sample. They invest only in 968 out of 1350 funds, which is about 71 percent of the sample. Omitting this fact might bias the results of the flow-performance relationship. To address this potential selection bias I will model both the decision to invest in a fund or not and the decision regarding how much to invest in the fund (flow regression) simultaneously in the next section using a Heckman selection model.[6]

4.2 The Investment Decisions of Insurance Companies and Pension Funds

The investment decisions of insurance companies and pension funds are different to those of households and financial corporations. While financial corporations and households can decide on their own, insurance companies and pension funds are regulated by the Federal Financial Supervisory Authority (BaFin) and have to prove that their investments in mutual funds comply with prudent-man principles. If these principles are violated, insurance companies and pension funds are not allowed to invest in the fund. This regulation might be the reason why there are no insurances and pension funds in one third of the funds in the sample. Thus, the decision of insurance companies and pension funds is twofold: first, whether they can invest in the fund or not; and second, how much they invest in the funds they are allowed to invest in.

[6]I also run a Heckman selection model for the group of financial corporations as a robustness check. The results of the Heckman model are very similar to the pooled OLS approach. The Heckman selection model is not feasible for households, since the number of funds that lack private investors is not sufficient.

To capture this two-part decision process I run a Heckman (1979) selection model. The flow-performance regression for insurance companies and pension funds is specified as before:

$$\begin{aligned} Flow_{i,j,t} = \quad & \beta_0 \quad + \beta_1 Low_{i,t-1} + \ \beta_2 Mid_{i,t-1} + \beta_3 High_{i,t-1} \\ & + \beta_4 Controls_{i,t-1} + \varepsilon_{1,i,j,t}, \end{aligned} \tag{6}$$

however, flows are only observed if insurance companies and pension funds decided to invest in the mutual fund or are not restricted from investing in this fund. This is the case if the following condition is fulfilled:

$$\gamma_0 + \ \gamma_1 Performance\ Rank_{i,t-1} + \ \gamma_2 Controls_{i,t-1} + \ \varepsilon_{2,i,j,t} > 0, \tag{7}$$

where

$$\varepsilon_1 \sim N(0, \sigma)$$

$$\varepsilon_2 \sim N(0, 1)$$

$$Corr(\varepsilon_1, \varepsilon_2) = \rho.$$

The explanatory variables of the selection equation are past performance, measured by the performance ranking over an evaluation period of 24 months, volatility also measured over the past 24 months, and the age and size of the fund. Furthermore, dummy variables indicating the investment objective and time dummies are included, but not reported. I estimate the Heckman two equation model using maximum likelihood. Results for the three different performance measures are displayed in Table 5.

The first column of each specification (FLOW) shows the flow-performance relationship already estimated (Eq. 6). The second column of each specification (SELECT) displays the results of the selection equation, the decision of the insurance companies and pension funds on whether to invest in the fund (Eq. 7). The estimation results are

virtually the same as before. Insurance companies and pension funds show a tendency to chase past performance, although not for all performance measures.

In the Heckman selection model a self-selection bias arises only if the correlation ρ between the residuals of equation (6) and (7) is not equal to zero. As can be seen from Table 5, the null hypothesis that ρ is equal to zero cannot be rejected on all conventional significance levels. Thus, a separate estimation, as carried out before, delivers already unbiased estimates.

Nevertheless, the selection equation provides some interesting insights. The probability of insurance companies and pension funds investing in a mutual fund decreases if the fund is a high performer. This result is in line with the avoidance of risk required by the prudent-man principles. High volatility, on the other hand, has no significant effect on the probability of insurance companies and pension funds investing in mutual funds. Moreover, insurance companies and pension funds tend to invest in older and larger funds, which can be interpreted as the fund having a long and good reputation, but it should also be borne in mind that only a long record makes it possible for insurance companies and pension funds to provide evidence of the security of the mutual fund to the regulator. The positive coefficient for fund fees might also indicate that insurance companies and pension funds see these funds as high quality funds. Or to put it differently: a high quality fund, which has maybe even received a quality rating, is simply able to charge a higher fee.

To quantify the effect of the explanatory variables on the probability of insurance companies and pension funds investing in a mutual fund I provide marginal effects of a Probit model. Since the residuals of the flow regression are uncorrelated with the residuals of the selection regression, a two-part model, i.e. separately running a Probit model and OLS regression, also yields unbiased results. Table 6 reports the marginal effects of the Probit model evaluated at the mean of the explanatory variables.

In summary, insurance companies show signs of performance chasing, although regulations seem to hinder them from investing in all mutual funds. Overall, the disaggregation

of the flow-performance relationship in their investor types supports the theory of Gruber (1996) and Berk & Green (2004); however, the results provide no clear-cut evidence of whether one group is punishing bad performance more severely. Only in some specifications do financial corporations show a significant flow-performance relationship in the lower segment. These results should be interpreted with caution since the fund flows, especially institutional flows, show very extreme values (see Table 2). The results of the flow-performance regression could accordingly be driven by a few extreme flows. Therefore, in the next section I will analyze the percentage holdings of investors. A difference in the flow-performance relationship should also become apparent in the stock of shares held by the different investor groups.

5 Mutual Fund Investor Composition

5.1 Investor Composition by Quintile

If all investors react in the same way to performance there should be no systematic difference in the percentage of shares held by investor groups in well or poorly performing funds. In contrast, if there are sophisticated investors and disadvantaged investors, the investor compositions for well and poorly performing funds should be different. Sophisticated investors learn about managerial ability and will increase their flows into high performing funds, which should consequently increase the percentage of shares held by sophisticated investors in top performing funds. By the same token there should be an increased percentage of disadvantaged investors in the worst performing funds.

In order to test this hypothesis I rank mutual funds according to their past performance within their investment objective and form five quintiles. In each quintile I determine the average size measured by the total net assets (TNA) of the fund and the average share of each investor group. The results can be found in Table 7. The difference in means between the groups is tested using a t-test. I test the differences between the top and bottom quintile (5-1), the 5th and 4th quintile (5-4) and the 2nd and 1st quintile (2-1).

The worst performing funds (bottom quintile) are much smaller on average than the better performing funds. Fund size increases with performance, but the top performing funds are slightly smaller on average than the fourth quintile in two out of three cases. This result is in line with the theoretical model by Berk & Green (2004), who argue that there are economies of scale in managerial ability.

The percentage share held by households is slightly higher for the worst performing funds than the top performing funds. This finding is in line with the previous results. Households do chase returns to some extent, but, in addition, other factors such as advertising might play an important role in the fund selection process.

The previous finding for financial corporations can also be confirmed. Financial corporations show the strongest tendency to chase past performance. The share of financial corporations in the top performing funds is therefore 19 while the worst performing funds only contain 13 percent on average (Panel A). Moreover, the difference between the top quintile and the second best quintile is distinct. The share of financial corporations increases by 6 percentage points from the 4th to the 5th quintile.

The group of insurance corporations and pension funds is clearly underrepresented in the top performing funds, even though there is some evidence of performance chasing for this investor group. Insurance companies and pension funds do not hold any shares in many of the better performing funds, which results in the large difference in means between the top two and the bottom three quintiles.

While this test shows distinct differences in investor composition between top performing funds and average funds, there is no clear difference between the worst performing funds and average funds. Even though the average size of mutual funds decreases from 260 million to 182 million Euro from the second to the first quintile (Panel A), the investor composition between the second and first quintile does not change considerably. Only the difference in mean shares for households is statistically significant, when comparing the second versus the first quintile. However, when testing against the 3rd or 4th quintile this difference becomes insignificant (not reported). This result implies that the speed with

which households, financial corporations, and insurance companies and pension funds leave the worst performing funds does not differ significantly.

5.2 Investor Composition: Robustness Checks

Since other factors might influence the percentage share held by one investor group I run a multivariate regression as a robustness check. I construct a dummy variable *Quintile 1* that is one if the fund's performance is in the first quintile and zero otherwise. Dummies for the other quintiles are constructed in the same way.

Table 1 shows that the holding structure of mutual fund investors changed over time. To account for the changing investor composition over time, I include time dummies as a control in the regression. Furthermore, different investor groups might have different preferences regarding the investment objective of the fund. This is controlled for by also including dummies for the fund investment objective. Additional controls are the funds' volatility, fees, size and age.

I run a regression of percentage shares of investor groups on the quintile dummies and the mentioned controls. The omitted category is the 3rd quintile. Thus, the coefficients of the dummy variables measure the difference relative to a fund with average performance. The results are essentially the same as for the univariate test. Most importantly, financial corporations hold a significantly higher share in the top performing funds than a fund with average performance. The composition of the worst performing funds, in contrast, does not systematically differ from the investor composition of the average fund. The finding of the flow-performance regression that financial corporations punish poorly performing funds more quickly is not confirmed when looking at the investor compositions. The significant flow-performance relationship in the low segment is thus most likely driven by only a few observations.

Furthermore, financial corporations seem to be less risk averse since their share is greater in funds with higher volatility. In addition, younger funds have an increased share of financial corporations as investors. One possible explanation is that financial corpo-

rations have better inside knowledge about the fund manager's ability and are therefore willing to buy younger funds.

Looking at the investor composition of mutual funds provides an additional test for the theory of Gruber (1996) and Berk & Green (2004). While this test provides evidence that sophisticated investors hold higher percentage shares in the best performing funds, the test cannot detect any systematic difference in investor composition between the worst performing funds and those with average performance. Thus, we do not observe a "burnout", where sophisticated investors exit poorly performing funds first and only disadvantaged and unsophisticated investors stay behind. The results are more in line with Lynch & Musto (2003), who argue that investors do not respond to poor performance, because they expect the management strategy or the management team to change.

6 Conclusion

Chasing past performance of mutual funds is often explained by asymmetric information or behavioral arguments. Gruber (1996) and Berk & Green (2004) provide an alternative explanation for this phenomenon. Sophisticated investors *rationally* chase past performance, because high past performance is a signal for managerial ability.

This paper provides a direct test of this theory by examining the flow-performance relationship of different investor groups in German mutual funds. The findings overall support the theory of Gruber (1996) and Berk & Green (2004). Financial corporations, arguably the most sophisticated investor group, have a strong tendency to chase past performance. The group of households comprises both sophisticated investors, who chase past performance, and unsophisticated investors, whose investment decision is driven by advertising or status quo bias. Insurance companies and pension funds show signs of being institutionally disadvantaged. There is some evidence that this investor group chases past performance, but they are underrepresented in the best performing funds, probably due to investment restrictions. Surprisingly, I find no significant difference between the

investor composition of the worst performing funds and those with average performance. These results provide new insights into the investment decisions of different mutual fund investors and the different flow-performance relationships of investor groups.

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Table 1: Sample Summary Statistics

This table shows summary statistics of the mutual fund data set at the end of each year. First, it shows the total number of funds and the number of funds in each investment objective (Germany, Europe and Global). Second, it shows other averages of mutual fund characteristics: TNA are the total net assets in million Euro. Expense ratio is the average expenses per year divided by average total net assets. Total load includes front-end and back-end loads. Age is the age since inception in years. Return is the 12-month return in percent. The standard deviation is calculated using monthly returns from the past 12 months. Third, it displays the number of funds with depositor information available and the value-weighted percentage shares by the depositor groups (Households, Financial Corporations, Insurance Companies and Pension Funds and Other Investors).

Year	**2005**	**2006**	**2007**	**2008**
Total	239	246	247	243
Germany	50	52	50	46
Europe	106	108	111	109
Global	83	86	86	88
TNA (Million EUR)	328.9	357.9	358.8	197.3
Expense Ratio (%)	1.42	1.35	1.37	1.40
Total Load (%)	4.08	3.87	3.98	3.94
Age (Years)	11.53	11.83	12.30	12.48
Return (%)	24.06	15.30	4.52	-37.94
Std. Deviation (monthly returns)	3.39	2.98	3.02	5.93
Funds with Depositor Information	159	172	221	225
Coverage (%)	66.5	69.9	89.5	92.6
Households (%)	70.9	64.4	59.2	58.1
Financial Corporations (%)	11.3	17.0	14.3	14.2
Insurance companies and Pension Funds (%)	12.7	12.3	19.7	22.0
Other (%)	5.1	6.3	6.8	5.7

Table 2: Descriptive Statistics of Investor Flows

This table shows descriptive statistics of quarterly flows by investor type. Flows are the change in shares as a percentage of the number of shares held in the previous period. All reported measures are time series averages of the cross-sectional measures.

			Percentiles				
	Mean	Std. Dev.	10th	25th	50th	75th	90th
Total	-2.41	10.88	-11.92	-6.18	-2.63	0.06	6.40
Households	-3.30	8.50	-10.53	-5.96	-3.66	-1.21	2.94
Financial Corporations	10.00	80.29	-36.83	-13.03	-1.60	6.83	44.96
Insurance Companies and Pension Funds	3.63	38.53	-6.19	-0.13	0.71	3.81	13.58

Table 3: Correlations between Investor Flows

This table shows time series averages of pairwise correlation coefficients between total flows and flows of different investor groups. Flows are the change in shares as a percentage of the number of shares held in the previous period.

	Total	Households	Financial Corporations	Insur. Companies and Pension Funds
Total	1.000			
Households	0.554	1.000		
Financial Corporations	0.363	0.075	1.000	
Insurance Companies and Pension Funds	0.200	0.044	0.049	1.000

Table 4: Flow-Performance Relationship

This table shows the effect of past performance on total net flows and net flows separated by investor type. All explanatory variables are lagged and, in addition, the regression includes time dummies and dummies for the investment objective, which are not reported. Performance is measured by Raw Return, Sharpe Ratio and Jensen's Alpha (Panel A, B and C) calculated over the past 24 months. Quarterly flows are regressed on low, mid and high performance ranges and controls. Lagged flow is the flow of the previous quarter, volatility is measured as the standard deviation over the performance evaluation period, total fee is the expense ratio plus 1/3 of total loads, size is measured by the natural logarithm of assets and age is the natural logarithm of one plus age in years. Robust standard errors clustered at the fund level are given in parentheses. *, **, and *** indicate significance at the 10%, 5% and 1% level respectively.

Panel A: Raw Return

	Total	Households	Financial Corporations	Insur. Companies & Pension Funds
Low	18.00***	4.80	33.36	33.80
	(6.86)	(5.29)	(37.62)	(24.54)
Mid	-1.15	0.66	-0.72	-3.08
	(1.57)	(1.40)	(11.75)	(4.68)
High	37.79***	15.72**	120.45*	80.17**
	(12.84)	(7.42)	(68.01)	(39.36)
Lagged Flow	0.13***	0.26***	-0.06*	0.05
	(0.05)	(0.07)	(0.03)	(0.04)
Volatility	-1.39*	-0.64	-5.04	-2.81
	(0.84)	(0.76)	(3.50)	(3.40)
Total Fee	-1.49***	-0.95**	-4.84	1.59
	(0.57)	(0.40)	(3.47)	(2.16)
Size	-0.11	-0.04	-1.25	0.30
	(0.23)	(0.16)	(1.40)	(1.10)
Age	0.52	0.11	-1.00	-2.59
	(0.62)	(0.48)	(4.14)	(2.08)
Constant	5.21	4.67	73.28*	1.24
	(5.23)	(5.04)	(42.28)	(23.26)
Observations	1350	1317	1262	968
R-squared	0.094	0.125	0.021	0.043

(continued)

Table 4 -Continued

Panel B: Sharpe Ratio

	Total	Households	Financial Corporations	Insur. Companies & Pension Funds
Low	18.03***	7.17	106.90**	33.91
	(6.41)	(4.50)	(48.54)	(26.08)
Mid	-1.15	0.17	-23.13	-5.29
	(1.56)	(1.27)	(14.65)	(6.21)
High	34.19***	17.50**	157.21**	33.90
	(11.11)	(7.24)	(66.40)	(28.99)
Lagged Flow	0.14***	0.26***	-0.06*	0.05
	(0.05)	(0.07)	(0.03)	(0.04)
Volatility	-0.31	-0.04	-1.28	-1.26
	(0.84)	(0.67)	(3.60)	(3.34)
Total Fee	-1.35**	-0.89**	-4.67	1.81
	(0.57)	(0.40)	(3.47)	(2.23)
Size	-0.07	-0.03	-0.94	0.70
	(0.23)	(0.15)	(1.38)	(1.02)
Age	0.41	0.09	-1.31	-3.18
	(0.61)	(0.47)	(4.10)	(2.04)
Constant	0.83	0.96	40.16	-9.54
	(4.98)	(4.58)	(41.18)	(22.06)
Observations	1350	1317	1262	968
R-squared	0.093	0.128	0.024	0.037

(continued)

Table 4 -Continued

Panel C: Jensen's Alpha

	Total	Households	Financial Corporations	Insur. Companies & Pension Funds
Low	16.35**	4.61	91.13**	28.02
	(6.69)	(4.98)	(42.98)	(30.59)
Mid	-0.50	0.30	-17.72	-7.94
	(1.48)	(1.27)	(14.55)	(8.11)
High	27.47**	17.26**	124.01**	42.41*
	(10.59)	(6.80)	(53.91)	(23.86)
Lagged Flow	0.14***	0.26***	-0.06*	0.05
	(0.05)	(0.07)	(0.03)	(0.04)
Volatility	-0.62	-0.29	-2.28	-1.64
	(0.83)	(0.70)	(3.28)	(3.38)
Total Fee	-1.47***	-0.97**	-5.13	1.51
	(0.56)	(0.40)	(3.62)	(2.32)
Size	-0.05	-0.02	-0.88	0.78
	(0.23)	(0.15)	(1.37)	(0.98)
Age	0.35	0.12	-1.63	-3.03
	(0.62)	(0.48)	(4.16)	(2.03)
Constant	2.24	2.63	48.84	-7.63
	(5.28)	(4.89)	(40.71)	(20.99)
Observations	1350	1317	1262	968
R-squared	0.087	0.127	0.021	0.037

Table 5: The Investment Decisions of Insurance Companies and Pension Funds

This table shows the investment decision of insurance companies and pension funds estimated using a Heckman selection model. The column FLOW indicates the flow-performance regression, where flows of insurance companies and pension funds are regressed on performance measures (Low, Mid and High) and controls. The control variables are defined as before (see Table 4). SELECT indicates the selection equation that models whether insurances and pension funds decide to invest in a fund or not. Explanatory variables for the selection equation are performance measured by the percentile rank and the control variables as before. The model is estimated by maximum likelihood. Robust standard errors clustered at the fund level are given in parentheses. *, **, and *** indicate significance at the 10%, 5% and 1% level respectively.

	Raw Return		**Sharpe Ratio**		**Jensen's Alpha**	
	FLOW	SELECT	FLOW	SELECT	FLOW	SELECT
Low	33.80		33.92		28.05	
	(24.28)		(25.81)		(30.30)	
Mid	-3.05		-5.22		-7.86	
	(4.61)		(6.10)		(7.94)	
High	80.14**		33.91		42.38*	
	(38.95)		(28.69)		(23.59)	
Performance Rank		-0.46***		-0.52***		-0.55***
		(0.17)		(0.18)		(0.17)
Lagged Flow	0.05		0.05		0.05	
	(0.04)		(0.04)		(0.04)	
Volatility	-2.81	-0.12	-1.24	-0.20	-1.62	-0.19
	(3.37)	(0.13)	(3.30)	(0.13)	(3.35)	(0.13)
Total Fee	1.57	0.66***	1.73	0.64***	1.43	0.65***
	(2.21)	(0.11)	(2.27)	(0.11)	(2.37)	(0.11)
Size	0.28	0.40***	0.67	0.40***	0.74	0.40***
	(1.12)	(0.04)	(1.04)	(0.04)	(1.00)	(0.04)
Age	-2.59	0.27***	-3.20	0.27***	-3.05	0.27***
	(2.05)	(0.10)	(2.01)	(0.10)	(2.00)	(0.10)
Constant	1.60	-8.39***	-8.66	-8.12***	-6.65	-8.15***
	(23.80)	(1.03)	(22.53)	(1.03)	(21.53)	(1.03)
$\lambda = \rho\sigma$		-0.11		-0.26		-0.29
		(0.80)		(0.76)		(0.81)
Observations		1350		1350		1350
Log Likelihood		-5444		-5445		-5445
Wald test: $\rho = 0$		0.02		0.13		0.15
p-value		0.89		0.72		0.70

Table 6: The Investment Decisions of Insurance Companies and Pension Funds: Probit-Model

This table shows the marginal effects of a Probit regression of the decision whether insurance companies and pension funds invest in a mutual fund or not. The dependent variable is a dummy that is one if insurance companies and pension funds invested in the mutual fund and zero otherwise. Explanatory variables are defined as before (see Table 4). Marginal effects are evaluated at the mean. Robust standard errors clustered at the fund level are given in parentheses. *, **, and *** indicate significance at the 10%, 5% and 1% level respectively.

	Raw Return	**Sharpe Ratio**	**Jensen's Alpha**
Performance Rank	-0.11	-0.12	-0.13*
	(0.08)	(0.08)	(0.07)
Volatility	-0.03	-0.05	-0.05
	(0.06)	(0.06)	(0.06)
Total Fee	0.18***	0.18***	0.18***
	(0.05)	(0.05)	(0.05)
Size	0.11***	0.11***	0.11***
	(0.02)	(0.02)	(0.02)
Age	0.07	0.07	0.07
	(0.06)	(0.06)	(0.06)
Observations	1350	1350	1350

Table 7: Investor Composition by Performance

This table shows the average total net assets in million EUR (TNA) and the average share (as percentage of total net assets) held by the three major investor groups. Funds were ranked within their investment objective into quintiles by their prior 24-month Raw Return, Sharpe Ratio and Jensen's Alpha. Total net assets are measured in million Euro, shares of the investor groups are in percent. Moreover, the table displays the total average over the whole sample. In addition, it provides the differences in means between the 5th and 1st quintile (5-1), the 5th and 4th quintile (5-4) and the 2nd and 1st quintile (2-1). The p-values of a t-test of equality in means are given in parentheses.

Panel A: Raw Return

	TNA	Households	Financial Corporations	Insur. Companies & Pension Funds
1 (Bottom)	182.7	66.3	10.8	17.3
2	259.6	61.7	9.7	19.7
3	490.7	65.2	11.9	15.9
4	593.7	67.3	12.8	13.2
5 (Top)	414.0	58.8	19.2	11.8
Total	390.2	64.0	12.8	15.6
5-1:	231.3	-7.6	8.4	-5.5
	(0.000)	(0.000)	(0.000)	(0.003)
5-4:	-179.7	-8.5	6.4	-1.4
	(0.008)	(0.000)	(0.000)	(0.428)
2-1:	76.9	-4.7	-1.1	2.4
	(0.042)	(0.046)	(0.443)	(0.255)

(continued)

Table 7 -Continued

Panel B: Sharpe Ratio

	TNA	Households	Financial Corporations	Insur. Companies & Pension Funds
1 (Bottom)	177.3	66.5	11.1	16.1
2	261.4	61.5	10.9	19.7
3	507.1	65.3	11.4	17.2
4	562.0	65.1	12.4	14.6
5 (Top)	445.3	61.5	18.0	10.4
Total	390.2	64.0	12.8	15.6
5-1:	267.9	-5.0	6.9	-5.7
	(0.000)	(0.022)	(0.000)	(0.001)
5-4:	-116.7	-3.7	5.6	-4.2
	(0.100)	(0.110)	(0.000)	(0.019)
2-1:	84.1	-5.0	-0.2	3.6
	(0.014)	(0.027)	(0.891)	(0.079)

(continued)

Table 7 -Continued

Panel C: Jensen's Alpha

	TNA	Households	Financial Corporations	Insur. Companies & Pension Funds
1 (Bottom)	193.1	67.3	10.8	16.3
2	298.2	61.2	10.4	20.2
3	435.6	66.4	11.1	16.5
4	529.2	62.2	14.1	15.0
5 (Top)	495.1	62.4	17.5	10.1
Total	390.2	64.0	12.8	15.6
5-1:	302.0	-4.9	6.7	-6.2
	(0.000)	(0.020)	(0.000)	(0.000)
5-4:	-34.1	0.2	3.5	-4.9
	(0.633)	(0.922)	(0.015)	(0.007)
2-1:	105.2	-6.1	-0.4	3.9
	(0.008)	(0.008)	(0.795)	(0.053)

Table 8: Investor Composition by Performance: Regression Results

This table shows the regression results of the share of depositor group on lagged performance and lagged control variables. Quintile 1 is a dummy variable that is equal to one if the fund is in the first performance quintile and zero otherwise. Quintile 2 - Quintile 5 are constructed in the same way. The omitted category is the 3rd quintile. Volatility is measured as the standard deviation over the performance evaluation period (24 months), total fee is the expense ratio plus 1/3 of total loads, size is measured by the natural logarithm of assets and age is the natural logarithm of one plus age in years. All specifications include time and investment objective fixed effects. Robust standard errors clustered at the fund level are given in parentheses. *, **, and *** indicate significance at the 10%, 5% and 1% level respectively.

Panel A: Raw Return

	Households	Financial Corporations	Insur. Companies & Pension Funds
Quintile 1	-0.66	-0.54	2.04
	(4.08)	(2.50)	(3.43)
Quintile 2	-3.93	-2.23	4.51*
	(3.37)	(1.51)	(2.46)
Quintile 4	2.02	0.72	-2.58
	(3.00)	(1.60)	(2.21)
Quintile 5	-5.65	4.78**	-3.15
	(3.58)	(2.13)	(3.11)
Volatility	-2.16	7.41***	-2.11
	(4.05)	(2.61)	(2.70)
Total Fee	0.49	-1.35	5.23**
	(3.19)	(1.75)	(2.11)
Size	-1.43	0.80	0.83
	(1.18)	(0.71)	(0.93)
Age	4.08	-6.41***	3.55
	(3.25)	(1.84)	(3.08)
Constant	93.86***	-24.45	-8.99
	(34.13)	(18.57)	(25.39)
Time Fixed Effects	Yes	Yes	Yes
Inv. Obj. Fixed Effects	Yes	Yes	Yes
Observations	1655	1655	1655
R-squared	0.053	0.143	0.080

(continued)

Table 8 -Continued

Panel B: Sharpe Ratio

	Households	Financial Corporations	Insur. Companies & Pension Funds
Quintile 1	0.16	-0.53	-0.23
	(3.92)	(2.44)	(3.37)
Quintile 2	-4.30	-0.58	3.10
	(3.03)	(1.45)	(2.74)
Quintile 4	-0.45	1.13	-2.48
	(2.68)	(1.33)	(2.18)
Quintile 5	-3.33	5.70***	-5.38*
	(3.16)	(1.76)	(2.79)
Volatility	-2.87	9.15***	-3.99
	(4.07)	(2.64)	(2.66)
Total Fee	0.38	-1.06	5.07**
	(3.22)	(1.75)	(2.14)
Size	-1.49	0.80	0.82
	(1.20)	(0.69)	(0.94)
Age	4.43	-6.35***	3.23
	(3.27)	(1.82)	(3.09)
Constant	98.18***	-35.01*	3.25
	(34.70)	(18.04)	(26.00)
Time Fixed Effects	Yes	Yes	Yes
Inv. Obj. Fixed Effects	Yes	Yes	Yes
Observations	1655	1655	1655
R-squared	0.049	0.145	0.080

(continued)

Table 8 -Continued

Panel C: Jensen's Alpha

	Households	Financial Corporations	Insur. Companies & Pension Funds
Quintile 1	0.71	-1.32	0.66
	(4.09)	(2.40)	(3.46)
Quintile 2	-5.63*	-0.89	4.73*
	(3.14)	(1.53)	(2.75)
Quintile 4	-3.34	2.13*	-0.41
	(2.61)	(1.28)	(2.24)
Quintile 5	-3.31	4.66***	-4.92*
	(3.25)	(1.78)	(2.82)
Volatility	-3.01	8.65***	-3.20
	(4.01)	(2.63)	(2.64)
Total Fee	0.26	-1.10	5.20**
	(3.21)	(1.75)	(2.17)
Size	-1.42	0.74	0.87
	(1.19)	(0.70)	(0.93)
Age	4.54	-6.37***	3.10
	(3.30)	(1.83)	(3.10)
Constant	98.23***	-30.97*	-2.70
	(33.98)	(17.95)	(25.34)
Time Fixed Effects	Yes	Yes	Yes
Inv. Obj. Fixed Effects	Yes	Yes	Yes
Observations	1655	1655	1655
R-squared	0.051	0.142	0.083

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