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Purchase and redemption decisions of mutual fund investors and the role of fund families

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Discussion Paper
Series 2: Banking and Financial Studies
No 03/2010

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Internet http://www.bundesbank.de

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ISBN 978-3–86558–614–8 (Printversion)
ISBN 978-3–86558–615–5 (Internetversion)

Abstract

This paper investigates the purchases and redemptions of a large cross-sectional sample of German equity funds. We find that investors punish bad performance by selling their shares, but also have a tendency to sell winners. Investors in large fund families show higher sales and redemption rates. Furthermore, family size also affects the flow-performance relationship. On the one hand, investors in large families punish bad performance more, on the other, they also tend to sell winners more. Finally, we find that inner-family rankings play an important role for redemptions, with investors strongly redeeming their shares from intra-family losers.

Keywords: Mutual Funds, Fund Family, Flow-Performance Relationship

JEL: G20, G23

Non-technical summary

The open-ended structure of mutual funds offers investors in principle an important disciplining mechanism: investors can reward the good performance of a mutual fund with inflows and punish poor performance with outflows (Fama & Jensen 1983). However, many studies have documented that mutual fund investors insufficiently punish poorly performing funds by withdrawing their money (e.g. Ippolito 1992, Chevalier & Ellison 1997, Sirri & Tufano 1998). At the same time, the fact that the average holding period of mutual fund investors is surprisingly low, ranging between only two and three years (Barber et al. 2005), reveals that investors actively manage their mutual fund holdings.

In this paper, we examine the flow-performance relationship of in and outflows for German equity funds over the period from 2003 to 2008. More specifically, we are interested in whether old investors punish poorly performing funds by withdrawing their money. A further issue is how the investment company, also known as the fund family, affects the purchase and redemption decision of mutual fund investors. Fund families can reduce the transaction costs, e.g. which investors incur when changing from one fund to another. First, it is common practice to reduce or even waive load fees when an investor switches funds within the same fund family. Second, the fund family can reduce the search costs of investors through marketing. Since larger fund families offer a wider spectrum of funds, investors have more opportunities to choose funds and thus we expect to observe a higher trading activity in larger fund families. We further hypothesize that reduced transaction costs in larger families should strengthen the punishment effect for the worst performing funds. Moreover, we argue that the relative performance of a fund within a family matters primarily for the redemption decision given that the transaction costs are only reduced within a fund family.

Overall, our findings generally support the notion that investors punish poor performance. When we investigate the role of fund family size, we find that funds in larger families experience higher inflows as well as higher outflows. More importantly, our results point to a differential impact of relative performance measures for mutual fund in and outflows. Apart from a level effect, our results also reveal that family size affects the flow-performance relationship. More specifically, existing investors in large families punish poor performance more severely than investors in small families. Finally, we provide evidence that the decisions to buy or sell mutual shares are based on different relative performance measures. While new investors chase the top performers within a fund category, old investors punish poor performance within the fund family.

Nichttechnische Zusammenfassung

Die offene Struktur von Investmentfonds stellt prinzipiell einen wichtigen Sanktionierungsmechanismus für Investoren dar: Einerseits können Investoren gute Performance durch Zuflüsse belohnen, andererseits können sie eine schwache Performance durch Abflüsse bestrafen (Fama & Jensen 1983). Eine Vielzahl von Studien hat jedoch festgestellt, dass Investoren eine schlechte Performance nur unzureichend durch Abflüsse bestrafen (z.B. Ippolito 1992, Chevalier & Ellison 1997, Sirri & Tufano 1998). Dies steht im Gegensatz zu der Tatsache, dass die durchschnittliche Haltedauer von Investmentfonds nur zwischen zwei und drei Jahren liegt (Barber et al. 2005). Letzteres ist ein Hinweis dafür, dass die Investoren ihre Anlagen in Investmentfonds aktiv steuern.

In diesem Arbeitspapier untersuchen wir den Zusammenhang zwischen Mittelflüssen und Performance von deutschen Investmentfonds in dem Zeitraum von 2003 bis 2008. Insbesondere ist von Interesse, ob bereits bestehende Investoren schlechte Performance durch Anteilverkäufe bestrafen. Des Weiteren ist von Bedeutung, inwiefern die Kapitalanlagegesellschaft des Fonds, die sogenannte Fonds-Familie, einen Einfluss auf den Zusammenhang zwischen Mittelflüssen und Performance hat. Fonds-Familien können das Anlageverhalten von Altinvestoren beeinflussen, indem sie die Transaktionskosten, die bei einem Fondswechsel anfallen, reduzieren. Erstens werden gewöhnlich Ausgabeaufschlag und Rücknahmeabschlag bei einem Fondswechsel innerhalb derselben Fonds-Familie reduziert oder sogar erlassen. Zweitens können die Suchkosten für den Investor durch gezieltes Marketing reduziert werden. Da größere Fonds-Familien ihren Investoren eine größere Auswahl an Fonds sowie geringere Transaktionskosten anbieten können, erwarten wir eine höhere Handelsaktivität für diese Fonds. Die reduzierten Transaktionskosten in großen Fonds-Familien können darüber hinaus zu einer verstärkten Bestrafung einer schwachen Performance führen. Da die Transaktionskosten jedoch lediglich in der eigenen Fonds-Familie reduziert werden, sollte das Performanceranking eines Fonds nicht nur innerhalb seiner Anlagekategorie, sondern auch innerhalb seiner Familie eine Rolle für die Verkaufsentscheidung von Investoren spielen.

Allgemein lassen unsere Ergebnisse darauf schließen, dass Investoren eine schlechte Ertragskraft durch Abflüsse bestrafen. Bei größeren Fonds-Familien kommt es sowohl zu größeren Zu- als auch vermehrten Abflüssen. Zusätzlich zu einem Niveaueffekt können wir einen veränderten Zusammenhang zwischen Mittelflüssen und Performance bei großen Fondsfamilien feststellen. Insbesondere kommt es in großen Fonds-Familien zu einer stärkeren Bestrafung von schlechter Performance. Des Weiteren zeigen wir, dass die Kauf- und Verkaufsentscheidung von Investoren auf unterschiedlichen relativen Performance-rankings beruhen. Während die Kaufentscheidung hauptsächlich von dem Ranking über die Investmentkategorie getrieben wird, ist die Verkaufsentscheidung durch das Ranking innerhalb der eigenen Fonds-Familie beeinflusst.

Contents

1 Introduction

The open-ended structure of mutual funds offers investors in principle an important monitoring mechanism: investors can reward the good performance of a mutual fund with inflows and punish poor performance with outflows (Fama & Jensen 1983). However, many studies have documented, that mutual fund investors only insufficiently punish poorly performing funds by withdrawing their money (e.g. Ippolito 1992, Chevalier & Ellison 1997, Sirri & Tufano 1998). Given the reluctance to punish poor performance the average holding period of mutual fund investors is surprisingly low, ranging between only two and three years (Barber et al. 2005). This raises the question of why investors fail to punish the poor performance of fund managers, even though they change funds so frequently.

Using a comprehensive data set that provides monthly purchases and redemptions of all equity funds registered in Germany, this paper tries to address this question. Being able to disaggregate net flows into sales and redemptions for a large cross-sectional data set allows us to gain further insights into investors' buy and sell decisions. In particular, we are interested in the driving factors behind redemptions.

The feasibility to effectively punish a mutual fund by redeeming one's shares is closely connected with transactions costs. When switching from one fund to another, investors face search costs and fees. These load fees are either charged when leaving a fund or, more commonly, when entering into a new fund. Front-end and back-end loads put together make up a considerable amount and average around four percent of the share value in our sample. High switching costs would explain the investors' low propensity to redeem shares and thus punish poor performance. However, as mentioned before, the average holding period is relatively low, which should be reflected in a higher punishment of under-performing funds.

In this paper we argue that fund families play an important role in the redemption decision of mutual fund investors. Fund families can reduce the costs of switching from one fund to another. A common practice is to allow investors to switch from one fund to another within the same family at a discount or for no fee at all. Furthermore, the fund family provides investors with more information on other funds within the same family (e.g. by marketing) and thereby lowers search costs. Overall, larger fund families offer the investors more opportunities to switch between funds at lower transaction costs.

We first investigate how past performance affects purchases and redemptions separately. Second, we analyze how the fund family size affects the level of in- and outflows and the shape of each flow-performance relationship. Finally, if switching funds within the fund family plays an important role in investors' redemption decision, the fund's family ranking will potentially affect in- and outflows. We therefore study how the intra-family ranking in addition to the category ranking affect in- and outflows.

Our main findings are as folows: First, redemptions react to past performance and the relationship is u-shaped. On the one hand, existing investors in a fund punish bad performance by withdrawing their money. On the other, some investors cash in their gains and sell winning funds, which is known as the disposition effect. Second, the size of the fund family changes the level of redemptions and the shape of the flow-performance relationship. Larger fund families have a higher redemption rate and a higher purchase rate. The elevated redemption rate leads to an increased punishment of the worst performing funds. However, in some cases it also results in a higher tendency to sell winning funds. Finally, this paper looks at a performance comparison within the same fund family. We find that, in addition to the documented sensitivity to bad performance in the overall ranking, redemptions also react quite strongly to an intra-family ranking.

The paper is related to two strands of literature: First, the paper contributes to the gross flow literature on mutual funds. While there is a wealth of literature that relates net flows to past performance (e.g. Ippolito 1992, Chevalier & Ellison 1997, Sirri & Tufano 1998), articles that investigate inflows and outflows of mutual funds separately are relatively scarce. This is because data on inflows and outflows is not usually available and net flows are approximated using the growth of total net assets adjusted for the growth due to the funds' return. However, since the decision to buy a mutual fund potentially differs from the decision to sell a mutual fund, it is important to analyze inflows and outflows separately (Ivkovic & Weisbenner 2009).

The gross fund literature is particularly interested in whether old investors use the possibility of punishing poor performance by redeeming their shares. Results on how redemption rates relate to past performance are mixed. While some studies find no response of outflows to past performance (e.g. Bergstresser & Poterba 2002, Johnson 2007), others find that redemptions increase with bad performance (e.g. O'Neal 2004, Ivkovic & Weisbenner 2009). Since these studies use relatively small sample they potentially suffer from selection bias, which might provide an explanation for these conflicting findings (Johnson 2007).[1] Our paper contributes to the literature by using a large cross-sectional sample of German equity funds. This sample contains all mutual funds registered in Germany and provides the amount of purchases and redemptions with a monthly frequency and thus overcomes possible selection biases.

Second, our paper relates to the growing literature on fund families (e.g. Massa 2003, Nanda et al. 2004, Gaspar et al. 2006). In particular, it refers to Kempf & Ruenzi (2008*a*), who show that, besides the investment category ranking, the ranking within a fund family also matters for net flows. Furthermore, Kempf & Ruenzi (2008*b*) find that in addition to tournaments within an investment category (Brown et al. 1996) there are also tournaments within a fund family. This paper brings together these two strands - the literature on gross flows and on fund families - by showing that while new money (the purchase decision) is closely related to the overall category ranking, old money (the redemption decision) is related to the ranking within a fund family.

The remainder of the paper is structured as follows: Section 2 describes the data set that is used. Section 3 investigates the flow-performance relationship of in- out and net

[1]These studies mostly focus on proprietary data from a single fund family or concentrate only on the 200 largest mutual funds. The only studies that we know of that use a wider cross-sectional data set are Christoffersen et al. (2005) and Cashman et al. (2007) for the US and Keswani & Stolin (2008) for the UK.

flows. In section 4 we analyze the difference in the flow-performance relationship between large and small fund families. Finally, in section 5 we look at how the intra-family ranking affects purchases and redemptions. Section 6 concludes.

2 Data and Descriptive Statistics

2.1 Mutual Fund Data

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 are our main data set and contain information on the number of shares outstanding, total net assets, buy and sell prices and dividends paid. The data set also includes funds that either ceased to exist or merged with other funds and is therefore free of a survivorship-bias. To make funds comparable we 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 on the investment objective as well as the total expense ratio was obtained from the German Federal Association of Investment Companies (Bundesverband Deutscher Investmentgesellschaften, BVI). Since calculation of the total expense ratio was only standardized in 2003 we restrict our sample to the period from 2003 to 2008.

[Insert Table 1 about here]

In Table 1 we show summary statistics of the sample. Panel A provides the number of funds in Germany over time, by investment objective (Germany, Europe or Global) and for load funds. Overall, the number of funds increases slightly over time, which is primarily due to the launch of new funds with a European investment focus. The majority of our

[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 included in this sample.

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

sample is dominated by funds that charge load fees. Panel B highlights that the total net assets managed grew from 2003 to 2007 and dropped sharply in 2008. The increase in assets up to 2007 is due to the appreciation in the value of assets. In fact, net flows were negative on average in this period, meaning that investors sold these mutual funds. Redemption rates are astonishingly high, averaging at around 36 percent. This implies an average holding period of 35 months, which is fairly short given that equity mutual funds tend to be considered a long-term investment. The latter aspect is particulary surprising given that total loads average at around 4 percent. However, the short holding period seems not to be country-specific. Barber et al. (2005) find similarly short holding periods for the US market of around 30 months in the late 90s. The table further displays statistics on common mutual fund characteristics, such as return, standard deviation, age, size and fees in Panel C.

2.2 Fund Flows

Mutual funds report the amount of redeemed and purchased shares in euros for each month to the Deutsche Bundesbank. We calculate in-, out- and net flows separately in relation to total net assets at the end of the previous period:

$$Inflow_{i,t} = \frac{Purchases_{i,t}}{Total\ Net\ Assets_{i,t-1}} \tag{1}$$

$$Outflow_{i,t} = \frac{Redemptions_{i,t}}{Total\ Net\ Assets_{i,t-1}} \tag{2}$$

$$Netflow_{i,t} = Inflow_{i,t} - Outflow_{i,t} \tag{3}$$

All flows are annualized by multiplying them by a factor of 12. Very unusual flows can occur for very young funds, when mergers take place or when a fund closes down. To avoid these outliers we omit observations with a growth rate below the 1st and above the

99th percentile.

Table 2 shows the pairwise correlation coefficient of net flows, inflows and outflows. It is noteworthy that we observe a high positive correlation coefficient between inflows and outflows. This suggests that funds with higher inflows also experience higher outflows.

2.3 Performance Measures

We use three alternative measures of performance which are commonly reported for mutual funds (e.g. by Morningstar): the raw return, Sharpe Ratio and Jensen's Alpha. The raw return is calculated assuming that gross dividends are reinvested immediately. We calculate the Sharpe Ratio as the average excess return in the evaluation period divided by the variance of returns (Sharpe 1966):

$$Sharpe\ Ratio_i = \frac{\overline{R_i - R^f}}{\sqrt{Var(R_i)}}, \tag{4}$$

where R_i is the monthly return of fund i, R^f the risk-free rate measured by the 1-month EURIBOR. To estimate the Sharpe Ratio we use data for the past 24 months.

Finally, we use the performance measure proposed by Jensen (1968). Jensen's Alpha is estimated as follows:

$$R_i - R^f = \alpha_i + \beta_i(R^m - R^f), \tag{5}$$

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 return on the market portfolio is measured by the benchmark index for each investment objective. We use the following three benchmark indices, which are generally used to evaluate mutual funds: 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, shows very similar results. Because we are using a 24-month evaluation period, we exclude funds with less than two years of data from our sample.

3 Flow-Performance Relationship

3.1 Univariate Analysis

As a first step in our analysis of investors' buying and selling behavior in response to performance, we conduct a simple univariate analysis. Following Sirri & Tufano (1998) and Huang et al. (2007), we rank mutual funds within their investment objective in ten deciles based on their performance, where performance is measured by the raw return over the past 24 months.[4] Taking the average of flows in each decile, we obtain a cross-sectional flow-performance relationship for in-, out- and net flows. The results of this procedure for our three performance measures can be found in Figure 1.

[Insert Figure 1 about here]

Net flows show the familiar convex shape (e.g. Zheng 2008). Note that in the sample period aggregate net flows are negative, which is also reflected in this graph. Net flows are for the most part negative, only the top performing funds experience positive growth. The convex shape of net flows is mainly driven by inflows into the fund. The top performing funds show an annualized inflow rate of around 50 percent, while a fund with an average performance (i.e. the 5th decile) shows inflows of around 17 percent. Interestingly, inflows do not change at all when moving from a fund with an average performance to the worst performing funds. The worst performing funds experience inflows at about the same level, which is a sign of the status quo bias (Samuelson & Zeckhauser 1988, Kempf & Ruenzi 2006).

Outflows are at a relatively high level of around 30 percent. The flow-performance relationship of redemptions is weakly u-shaped. While the 5th decile shows outflows of 26 percent, the worst performing funds have outflows of about 32 percent. This suggests that

[4] The raw returns differ significantly across deciles. More specifically, the difference between the mean return of funds in the 1st and 2nd decile is 6 percent and amounts to around 8 percent for funds in the 9th and 10th decile. These return differences should thus present an incentive for investors to switch between funds of different performance deciles.

some investors punish the worst performing funds by withdrawing their money. On the other hand, we also observe heightened outflows for the best performing funds of about 38 percent, which can be interpreted as selling winners (see Kahneman & Tversky 1979, Shefrin & Statman 1985).

3.2 Multivariate Analysis

In order to estimate the flow-performance relationship, we run a piecewise-linear regression (see e.g. Sirri & Tufano 1998, Huang et al. 2007). For each month, mutual funds are ranked within their investment objective according to their past performance, where performance is measured by the raw return, Sharpe Ratio and Jensen's Alpha over the past 24 months. This rank is then normalized such 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 as follows:

$$\begin{aligned} Low_i &= Min(Rank_i, 0.20) \\ Mid_i &= Min(Rank_i - Low_i, 0.60) \\ High_i &= Rank_i - Mid_i - Low_i, \end{aligned} \tag{6}$$

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.

In addition to performance, several other variables might influence flows into and out of mutual funds. For this reason, we include size measured by the natural logarithm of total net assets, fund age measured by the natural logarithm of one plus age in years, volatility measured by 24-month standard deviation of monthly returns and total expenses in the regression.[5] Further, we include the aggregate flows of the investment objective into the regression to control for possible market-wide sentiment shifts. The regression model is specified as follows:

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

We run a Fama-MacBeth regression of fund flows on performance and controls for each month and provide average coefficient estimates in Table 3. Since performance is measured over the past 24 months, the estimates are likely to be autocorrelated. To address this issue, we use Newey-West autocorrelation and heteroscedasticity-consistent standard errors with five lags.

[Insert Table 3 about here]

The results of the univariate analysis are confirmed. Net flows show the familiar convex pattern, which is mainly driven by the strong convexity of inflows. This result affirms previous evidence that mutual fund investors chase past relative performance (Sirri & Tufano 1998). Additionally, we are also able to identify a u-shaped pattern of outflows. This means that investors withdraw their money from badly performing funds. When looking at the raw return as a performance measure, the outflows of the worst performing funds are about 9 percentage points higher than for the average fund. On the other hand, investors also sell their winning funds. Outflows from the best performing funds are about 6 percentage points higher than for the average fund. This disposition effect is

[5]Total expenses are measured by expense ratio + 1/3 total load. Since the average holding period was 2 - 3 years in the sample, we 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.

usually obscured by the strong inflows to the best performing funds when only net flows are observed. These results are robust for all performance measures.

The control variables also reveal new insights into mutual fund investors' buy and sell decisions. A number of control variables work in the same direction for in- and outflows and thus cancel each other out when they are used to explain net flows. In our estimation, these variables are size, age, total fees and also volatility. Both in- and outflows increase with size, while the overall effect on net flows is negative but insignificant. The negative effect of size on net flows is in line with the literature (Chevalier & Ellison 1997, Sirri & Tufano 1998, Huang et al. 2007).

The age of a fund reduces the intensity of trading. Both inflows and outflows are negatively related to the age of the fund, while the effect for net flows is insignificant. Total fees also show counteracting effects for in- and outflows. On the one hand, a higher expense ratio is associated with a higher level of inflows. While this may appear counterintuitive at first sight, the positive effect has been explained in the literature by the fact that expenses are a proxy for marketing expenses. Sirri & Tufano (1998) argue that increasing expenses heightens the fund's visibility and thus leads to more new purchases of the fund. On the other hand, the costs of financing the marketing efforts cause the investors that have already invested in the fund to leave.

Separating net flows into purchases and redemptions also reveals some new insights into the investors' choices and the volatility of a fund's assets. The hypothesis that fund investors are risk averse, i.e. fund volatility is negatively related to net flows, finds only fairly weak support. Fund volatility is negatively related but only marginally significant when we use raw returns as a performance measure (compare e.g. Sirri & Tufano 1998, James & Karceski 2006, Chen et al. 2007). Turning to outflows, we observe that investors that are already in the fund do indeed withdraw their money if the fund's volatility increases. Surprisingly, inflows are positively related to fund volatility. The effect of volatility on inflows is significant when we use risk adjusted performance measures such as the Sharpe Ratio and Jensen's Alpha to calculate volatility. A possible explanation for this result is provided by different investor clienteles. Apparently, more risk-averse investors exit funds when volatility rises and are replaced by more risk-seeking investors.

Overall, the disaggregation of net flows into its components purchases and redemptions reveals important insights in the actual behavior of the investors. We find that there are several variables that effect investors inside and outside the fund differently. While inflows show a strong convex flow-performance relationship, the flow-performance relationship of outflows is u-shaped. Existing investors punish the worst performing funds by withdrawing their money, but at the same time they cash in gains by leaving the best performing funds.

4 Flow-Performance Sensitivity and Fund Family Size

In the previous section, we examined the flow-performance relationship based on relative performance rankings within different investment categories. While the convex shape of the flow-performance relationship is well documented in the literature, the role of fund families has received less attention (Nanda et al. 2004). The mutual fund company that a fund belongs to, also known as the fund family, plays an important role for the member funds and provides additional services to the investors. Commonly, fund families offer investors the opportunity to switch funds within a mutual fund family for free or for a reduced load fee. Furthermore, through the families' marketing efforts the investor is more aware of other funds within the same fund family and thus also reduces transaction costs. Since a large fund family can offer a wider range of potential target funds at lower costs to the investor, we expect investor behavior to differ according to family size. More specifically, we hypothesize that investors in large families switch more frequently between funds and thus potentially react more swiftly to differences in performance.

[Insert Figure 2 about here]

In fact, Figure 2 confirms that both inflows and outflows are substantially higher for larger families. While small fund families with up to ten funds have a redemption rate of 23 percent, large fund families whose number of funds lies between 31 and 40 have a redemption rate of 45 percent. This implies an average holding period of 52 months for small families and only 27 months for large fund families. The heightened activity of investors in large fund families also potentially affects the shape of the flow-performance relationship. That is, the sanctioning mechanism for managers may be more pronounced in large families, because investors are confronted with lower transactions costs when switching from one fund to another within a family.

4.1 Univariate Analysis

To investigate the effect of family size on the flow-performance sensitivity of investors, we separately analyze large and small fund families. We measure fund family size by the number of funds in the family. For each month we divide the sample into small families, whose size is below the median family size, and large families, whose size is above the median family size. We then rank the fund according to its performance within the investment objective and form ten deciles and average in- out- and net flows in each decile. The flow-performance relationship of large and small fund families obtained in this way is displayed in Figure 3.

[Insert Figure 3 about here]

The overall shape of the relationship for net flows is similar for small and large families. However, large differences exist at the upper and lower end of the performance distribution. The top performing funds of smaller families receive substantially higher net flows than top performers from large families. In addition, the worst performers of large families also face much higher redemptions than their peers from smaller families. Turning to in- and outflows separately, we observe that the differences for net flows are primarily driven by outflows. Outflows vary in level and shape for large and small families. In fact, the outflows of the worst performing funds in large families are substantially higher than in smaller families.

With regard to inflows, we also observe differences but to a lesser extent. Funds from larger families receive more inflows of new money than their peers from smaller families. However, these differences only exist in the center decile while in the top and bottom deciles the discrepancy disappears. This result provides initial support for our hypothesis that family size leads to an asymmetric flow-performance relationship. Investors in large families do indeed seem to punish underperforming funds more strongly by withdrawing money. At the same time, investors in top performers of large families also appear to withdraw more money in relative terms, than from similar funds in smaller families, which indicates an increased disposition effect. Overall, the larger redemption rate in combination with a higher level of purchases indicates that investors change their funds more often in larger fund complexes.

4.2 Multivariate Analysis

To further evaluate the asymmetric flow-performance relation induced by family size, we run a regression of flows on performance including a dummy variable for a large family and also interacting the dummy variable with the performance segments. The estimated model is as follows:

$$\begin{aligned} Flow_{i,t} = \quad \beta_0 \quad & + \beta_1 Low_{i,t-1} + \beta_2 Low_{i,t-1} * Large\ Family_{i,t-1} \\ & + \beta_3 Mid_{i,t-1} + \beta_4 Mid_{i,t-1} * Large\ Family_{i,t-1} \\ & + \beta_5 High_{i,t-1} + \beta_6 High_{i,t-1} * Large\ Family_{i,t-1} \\ & + \beta_7 Family\ Size_{i,t-1} + \beta_8 Controls_{i,t-1} + \varepsilon_{i,t}, \end{aligned} \tag{7}$$

where $Flow_{i,t}$ is either in-, out- or net flows, $Low_{i,t-1}$, $Mid_{i,t-1}$ and $High_{i,t-1}$ are the performance segments as defined previously, $Large\ Family_{i,t-1}$ is a dummy variable that is one if the family size is above median and zero otherwise. $Family\ Size_{i,t-1}$ is measured by the number of funds in the family. All previously included control variables remain unchanged.

We show the results of Eq. 7 in Table 4. Belonging to a large fund family increases both inflows and outflows. An increase of one fund in family size leads to an increase of inflows by 0.84 percentage point and an increase of outflows by 1.04 percentage point, when considering the raw return as a performance measure. This is in line with the findings of Figure 3. The level effect of belonging to a large fund family on net flows is negative.

More importantly, the family size not only affects the level of in- and outflows, but also the shape of the flow-performance relationship. Investors in funds of large families are more responsive to bad performance than investors in small fund families. When taking the raw return as a performance measure, the worst performing funds of large fund families have redemption rates that are 14 percentage points higher than the best performer in the lowest segment. In small fund families, on the other hand, redemption rates for the worst performing funds are only around 7 percentage points higher than the best performer in the lowest segment. This effect is even more pronounced when measuring performance by the Sharpe Ratio or Jensen's Alpha, where funds of small families show no significant punishment. Apparently, the reduced transaction costs reinforce the disciplining effect via withdrawals of investors in the worst performing funds. Moreover, funds in the medium performance segment have a stronger inflow-performance sensitivity when they belong to larger fund families. Huang et al. (2007) provide a possible explanation by arguing that the medium performers benefit from the enhanced visibility of larger fund families.

Regarding top performing funds of large families, we find no clear-cut result concerning in- and outflows. The size of the fund family does not affect the flow-performance relationship in a significant way.

5 Intra-Family Ranking and Investor Flows

Next, we examine the performance of a fund relative to its family peers. Our working hypothesis is that the family ranking also matters for existing investors. These investors potentially focus their investment decisions on a narrower group of funds offered by the fund family. This focus on the fund family may be induced by lower transaction costs and enhanced visibility, which leads existing investors to switch predominantly between funds within a family rather than between families.

To measure the relative success of a fund within its family, we follow Kempf & Ruenzi (2008*a*) and order all funds belonging to the same fund family according to their category rank. Based on this category rank we then assign a new fund family rank and standardize this relative performance measure as before. We then run the following regression model including both the category and family ranking:

$$\begin{aligned} Flow_{i,t} = \;\; \beta_0 \;\; & + \beta_1 Category\ Low_{i,t-1} + \; \beta_2 Category\ Mid_{i,t-1} + \beta_3 Category\ High_{i,t-1} \\ & + \beta_4 Family\ Low_{i,t-1} + \; \beta_5 Family\ Mid_{i,t-1} + \beta_6 Family\ High_{i,t-1} \\ & + \beta_7 Controls_{i,t-1} + \varepsilon_{i,t}, \end{aligned} \tag{8}$$

where $Flow_{i,t}$ is again either in-, out- or net flows, $Category\ Low_{i,t-1}$, $Mid_{i,t-1}$ and $High_{i,t-1}$ is the piecewise decomposition of the category rank and $Family\ Low_{i,t-1}$, $Mid_{i,t-1}$ and $High_{i,t-1}$ the piecewise decomposition of the family rank (see Eq. 6 for details). Control variables are the same as before. We display the results in Table 5.

[Insert Table 5 about here]

Most notably, outflows are no longer affected by the category ranking for the worst performing funds. Instead, outflows from funds in the lowest performance segment only react to the family ranking. The size of the redemptions is economically significant. The worst performing funds in a family incur between 4 and 6 percent more outflows according to our three performance measures than the best performer in the lowest segment of the family ranking. New money, however, is unaffected by the family ranking and follows only the performance ranking within the category. In other words, new money is chasing winners within the category, while old money exits from the losers within the family. This is in line with the findings of Kempf & Ruenzi (2008*b*), who report that mutual fund managers also participate in intra-family tournaments.

Our results highlight an important feature of investors' purchase and redemption decisions. Specifically, the investment decisions are based on different relative performance measures. This evidence contrasts with Ivkovic & Weisbenner (2009), who argue that redemptions are driven by absolute performance.[6] Furthermore, our findings are also important for studies examining net flows. Since different relative performance measures impact in- and outflow this needs to be taken into account for net flows.

Our results for the distinct relative performance measures affecting in- and outflows are robust across the three performance measures used. Finally, the results in Table 5 show mixed evidence for the tendency of investors to sell winners. The coefficient for outflows from top performers by category rank is positive for two of our three performance measures but only significant when we use raw returns.

6 Conclusion

In this paper, we provide evidence of the differential impact of relative performance measures for mutual fund in- and outflows. First, we confirm the convex net flow-performance relationship typically found in the literature. Separating net flows into in- and outflows also reveals a convex shape for inflows but a u-shaped relation for outflows. For inflow this implies that new money chases winners while old money punishes losers but that investors also tend to sell winners.

[6]We also tested absolute performance as a driver of outflows but failed to detect any evidence in support of this measure.

Second, when we investigate the role of family size, we find that funds in larger families experience higher in- and outflows. Apart from a level effect, our results also reveal that family size affects the flow-performance relationship. More specifically, existing investors in large families punish poor performance more severely than investors in small families.

Finally, we show that new money chases the top performers within their category while old money punishes bad performers within the family. We provide evidence that the decisions to buy or sell mutual shares are based on different relative performance measures. This has been largely ignored in the literature, where the buy and sell decision has been based on the same relative performance measure.

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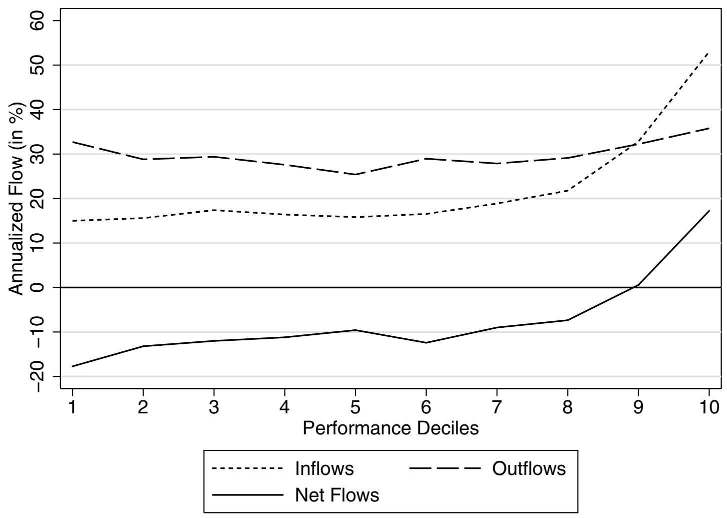


Figure 1: Flow-Performance Relationship
This figure shows the relationship of annualized monthly relative flows and the lagged performance during the period 2003-2008. Fund performance is measured by the percentile rank of the 24-month raw return within the fund's investment objective.

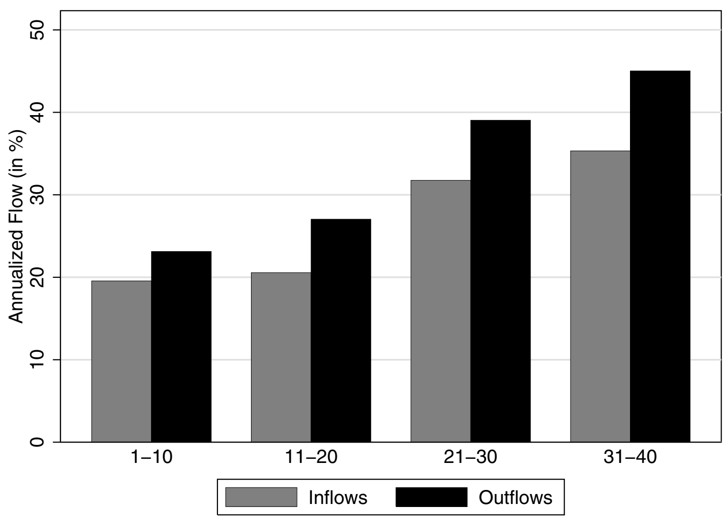
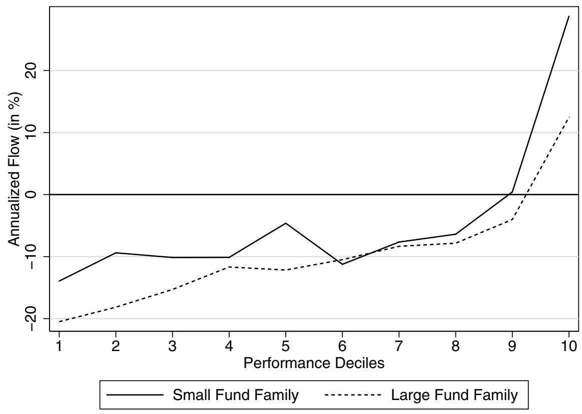
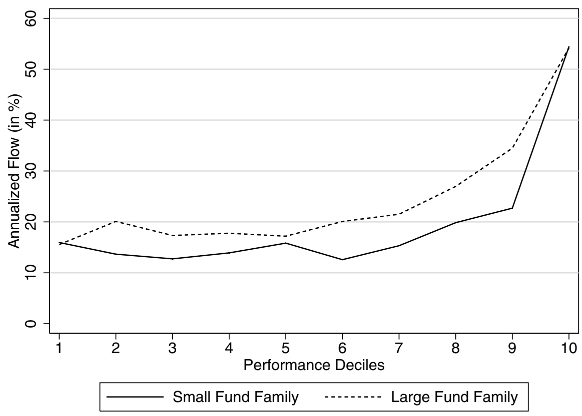


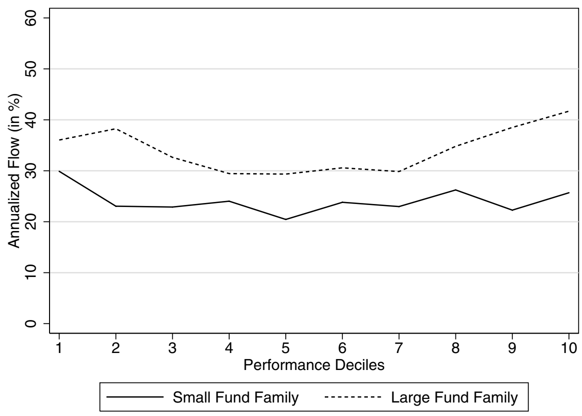
Figure 2: Relative Inflows and Outflows and Fund Family Size
This figure shows average relative in- and out-flows for different sizes of fund families. Fund families are sorted into four groups, families with less than or equal to 10 funds, between 11 and 20 funds, between 21 and 30 and families with between 31 and 40 funds.



(a) Net Flows



(b) Inflows



(c) Outflows

Figure 3: Fund Family Size and the Flow-Performance Relationship
This figure shows the relationship of annualized monthly relative in-, out- and net flows and lagged performance during the period 2003-2008. Funds are ranked into ten deciles according to their past 24-month return within the fund's investment objective. A large fund family is defined as a fund family with total net assets above the median.

Table 1: Descriptive Statistics

This table shows the descriptive statistics of the mutual fund data set. Panel A shows the number of funds, number and percentage of load funds and the number of funds for each investment objective (Germany, Europe and global). Panel B displays aggregate total net assets (TNA), in-, out- and net flows. Panel C reports the cross-sectional averages of the mutual fund data. Return is the 12-month return as a percentage. The standard deviation is calculated using the monthly returns of the past 12 months. The expense ratio is the average expenses per year divided by the average total net assets. The total load includes front-end and back-end loads. Age is the age since inception and size is the total net assets under management. In addition, it gives the average number of funds per family.

Year	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Average**
Panel A: Number of Funds:							
Total	233	228	239	246	247	243	239.3
Load Funds	205	202	209	214	216	208	209
Load Funds (%)	88.0	88.6	87.4	87.0	87.4	85.6	87.3
Germany	53	50	50	52	50	46	50
Europe	95	97	106	108	111	109	104
Global	85	81	83	86	86	88	85
Panel B: Aggregate Total Net Assets and Flows:							
TNA (Billion EUR)	64.172	65.857	78.598	88.054	88.621	47.949	72.209
Inflows (%)	53.3	29.5	26.8	27.4	29.8	18.4	30.9
Outflows (%)	49.1	31.4	31.2	36.0	36.5	21.2	34
Net Flow (%)	4.2	-1.9	-4.3	-8.6	-6.7	-2.8	-3.4
Panel C: Fund Data							
Return (%)	12.45	4.76	24.06	15.30	4.52	-37.94	3.9
Std. Deviation (%)	4.51	2.49	3.39	2.98	3.02	5.93	3.72
Expense Ratio (%)	1.42	1.39	1.42	1.35	1.37	1.40	1.39
Total Load (%)	4.04	4.09	4.08	3.87	3.98	3.94	4.00
Age (Years)	10.6	11.4	11.5	11.8	12.3	12.5	11.7
Size (Million EUR)	275.4	288.8	328.9	357.9	358.8	197.3	301.2
Funds per Family	13.9	13.9	15.3	16.3	16.4	15.6	15.2

Table 2: Cross-Correlation Table

Variables	Net Flow	Inflow	Outflow	Return	Std. Dev.	Expense Ratio	Total Fee	Age	TNA	Funds in Family
Net Flow	1.000									
Inflow	0.646	1.000								
	(0.000)									
Outflow	-0.531	0.303	1.000							
	(0.000)	(0.000)								
Return	0.020	0.032	0.009	1.000						
	(0.020)	(0.000)	(0.280)							
Std. Dev.	0.063	0.089	0.018	-0.609	1.000					
	(0.000)	(0.000)	(0.038)	(0.000)						
Expense Ratio	0.006	-0.005	-0.013	-0.054	0.016	1.000				
	(0.508)	(0.573)	(0.140)	(0.000)	(0.086)					
Total Fee	-0.025	-0.023	0.006	0.003	0.003	0.511	1.000			
	(0.004)	(0.007)	(0.507)	(0.764)	(0.740)	(0.000)				
Age	-0.024	-0.031	-0.005	0.060	0.013	-0.092	0.190	1.000		
	(0.004)	(0.000)	(0.545)	(0.000)	(0.126)	(0.000)	(0.000)			
TNA	0.015	0.059	0.047	0.065	-0.023	-0.131	-0.001	0.482	1.000	
	(0.066)	(0.000)	(0.000)	(0.000)	(0.008)	(0.000)	(0.905)	(0.000)		
Funds in Family	-0.033	0.134	0.190	0.068	0.022	-0.051	-0.100	0.158	0.279	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.013)	(0.000)	(0.000)	(0.000)	(0.000)	

Table 3: Flow-Performance Relationship

The table shows the results of a Fama-MacBeth regression of in-, out- and net flows on past performance and control variables. The performance measures are the raw return, Sharpe Ratio and Jensen's Alpha calculated over the past 24 months. The performance is measured by the fractional rank within the funds' investment objective, where *Low* indicates the bottom performance quintile, *Mid* the three medium quintiles and *High* the top quintile. The volatility is measured as the standard deviation over the performance evaluation period, the total fee is the expense ratio plus 1/3 of total loads, size is measured by the natural logarithm of total net assets and age is the natural logarithm of one plus age in years. The category flow is the aggregated in-, out- or net flow of the investment objective. Newey-West standard errors are given in parentheses. *, **, and *** indicate significance at the 10%, 5% and 1% level respectively.

	Raw Return			**Sharpe Ratio**			**Jensen's Alpha**		
	Net Flow	**Inflow**	**Outflow**	**Net Flow**	**Inflow**	**Outflow**	**Net Flow**	**Inflow**	**Outflow**
Low	39.67**	-12.44	-52.26**	48.70***	-2.42	-50.74***	39.72***	3.93	-35.74**
	(15.09)	(18.36)	(19.88)	(14.63)	(12.90)	(13.83)	(14.93)	(13.64)	(14.04)
Mid	6.91**	11.78***	4.98	8.34***	15.27***	7.00*	9.37***	14.28***	4.96
	(2.67)	(3.60)	(4.17)	(2.81)	(4.60)	(3.74)	(1.92)	(3.80)	(3.04)
High	195.57***	219.00***	23.63**	167.18***	178.57***	10.96	167.64***	187.44***	19.73**
	(24.77)	(18.89)	(10.77)	(21.76)	(20.47)	(8.86)	(22.86)	(19.76)	(8.42)
Size	-0.26	2.24***	2.48***	-0.08	2.36***	2.43***	-0.07	2.36***	2.41***
	(0.72)	(0.40)	(0.58)	(0.68)	(0.37)	(0.56)	(0.71)	(0.35)	(0.58)
Age	0.59	-3.73**	-4.42***	-0.21	-4.59**	-4.42***	0.20	-4.27**	-4.52***
	(1.34)	(1.75)	(1.23)	(1.39)	(1.85)	(1.21)	(1.35)	(1.75)	(1.23)
Volatility	-4.32*	1.94	5.93***	-0.94	5.26**	6.09***	-2.10	3.43*	5.35***
	(2.56)	(1.56)	(1.43)	(1.53)	(2.14)	(1.56)	(1.57)	(1.78)	(1.53)
Total Fees	-1.24	2.45	3.81***	-1.17	2.66*	3.91***	-1.31	2.56*	3.94***
	(1.65)	(1.61)	(0.81)	(1.61)	(1.59)	(0.79)	(1.62)	(1.53)	(0.79)
Category Flow	4.34*	1.33	1.41	3.51	0.06	0.42	3.49	0.32	-1.78
	(2.48)	(1.37)	(5.56)	(2.84)	(1.17)	(4.87)	(2.71)	(1.14)	(5.39)
Constant	0.13	-35.58***	-31.15	-7.69	-39.02***	-28.81	-4.23	-35.80***	-22.47
	(11.31)	(10.92)	(18.87)	(14.67)	(12.20)	(17.59)	(14.50)	(13.32)	(19.17)
Observations	10632	10632	10632	10632	10632	10632	10632	10632	10632
R-squared	0.063	0.124	0.051	0.059	0.121	0.044	0.062	0.126	0.043

Table 4: Family Size and the Flow-Performance Relationship

The table shows the results of a Fama-MacBeth regression of in-, out- and net flows on past performance and control variables. The performance measures are the raw return, Sharpe Ratio and Jensen's Alpha calculated over the past 24 months. The performance is measured by the fractional rank within the funds' investment objective, where *Low* indicates the bottom performance quintile, *Mid* the three medium quintiles and *High* the top quintile. Family size is measured by the number of funds in a fund family. Large family is a dummy variable that is one if the number of funds of the fund family is above the median and zero otherwise. In addition, the regression includes the control variables *Size*, *Age*, *Volatility* , *Total Fees* and *Category Flow*, which are not reported (see Table 3). Newey-West standard errors are given in parentheses. *, **, and *** indicate significance at the 10%, 5% and 1% level respectively.

	Raw Return			Sharpe Ratio			Jensen's Alpha		
	Net Flow	Inflow	Outflow	Net Flow	Inflow	Outflow	Net Flow	Inflow	Outflow
Low	40.46**	2.93	-37.50*	54.87***	43.33**	-11.30	42.77**	37.50*	-5.20
	(18.82)	(17.18)	(20.16)	(18.91)	(18.84)	(21.32)	(17.33)	(20.23)	(20.79)
Low * Large Family	-26.10**	-57.35***	-31.26*	2.69	-69.09***	-71.13***	2.65	-69.79***	-71.78***
	(11.31)	(16.42)	(17.03)	(13.90)	(17.96)	(24.63)	(11.72)	(21.54)	(26.55)
Mid	1.63	5.20*	3.36	5.51	5.60	0.06	9.73*	9.31**	-0.53
	(4.06)	(2.92)	(5.61)	(6.06)	(4.22)	(5.40)	(5.20)	(4.31)	(4.71)
Mid * Large Family	12.15**	5.86*	-6.03	8.66	11.70***	2.78	4.10	5.79*	1.51
	(5.43)	(3.46)	(4.84)	(7.33)	(3.25)	(6.06)	(5.89)	(3.18)	(5.83)
High	281.44***	277.10***	-1.57	268.87***	238.67***	-30.14**	271.10***	241.45***	-29.11**
	(49.41)	(57.02)	(19.47)	(45.45)	(40.02)	(14.11)	(73.39)	(69.00)	(11.79)
High * Large Family	-155.58**	-128.91	22.81	-166.56***	-125.12*	41.43	-136.09	-82.24	52.86**
	(65.26)	(86.74)	(35.54)	(53.91)	(63.01)	(25.52)	(84.52)	(98.87)	(22.41)
Family Size	-0.16	0.84***	1.02***	-0.30***	0.80***	1.11***	-0.33***	0.81***	1.14***
	(0.11)	(0.28)	(0.22)	(0.09)	(0.27)	(0.22)	(0.09)	(0.29)	(0.23)
Observations	10632	10632	10632	10632	10632	10632	10632	10632	10632
R-squared	0.086	0.161	0.106	0.090	0.162	0.103	0.090	0.171	0.103

Table 5: Intra-Family Ranking and the Flow-Performance Relationship

The table shows the results of a Fama-MacBeth regression of in-, out- and net flows on past performance ranking within the investment category and within the fund family. The performance measures are the raw return, Sharpe Ratio and Jensen's Alpha calculated over the past 24 months. The category ranking measured by the fractional rank within the funds' investment objective, where *Low* indicates the bottom performance quintile, *Mid* the three medium quintiles and *High* the top quintile. Family ranking is the ranking of the percentile rank within the funds' family, where *Low*, *Mid* and *High* are defined as before. In addition, the regression further includes the control variables *Size*, *Age*, *Volatility* , *Total Fees* and *Category Flow*, which are not reported (see Table 3). Newey-West standard errors are given in parentheses. *, **, and *** indicate significance at the 10%, 5% and 1% level respectively.

	Raw Return			Sharpe Ratio			Jensen's Alpha		
	Net Flow	**Inflow**	**Outflow**	**Net Flow**	**Inflow**	**Outflow**	**Net Flow**	**Inflow**	**Outflow**
Category Rank: Low	15.39	-17.36	-32.75	48.51***	7.86	-40.65**	37.34**	14.63	-22.71
	(14.91)	(22.21)	(20.99)	(15.53)	(13.03)	(15.46)	(14.79)	(16.25)	(15.13)
Category Rank: Mid	3.31	13.61***	10.30**	9.97**	17.45***	7.49	10.70***	17.18***	6.49
	(3.42)	(4.25)	(4.84)	(3.88)	(6.14)	(4.91)	(2.74)	(5.24)	(3.93)
Category Rank: High	201.68***	231.56***	29.88**	191.43***	184.64***	-6.79	196.36***	205.36***	9.00
	(26.05)	(22.50)	(12.37)	(24.83)	(23.15)	(9.47)	(25.00)	(22.95)	(11.12)
Family Rank: Low	21.26	-9.98	-31.24**	10.81	-8.86	-19.67***	22.82	-8.74	-31.56***
	(20.95)	(15.89)	(12.36)	(13.92)	(13.27)	(7.17)	(16.95)	(14.93)	(10.16)
Family Rank: Mid	4.17	-3.32	-7.49***	-2.37	-3.08	-0.71	-3.81	-4.41*	-0.60
	(3.11)	(3.44)	(2.49)	(2.74)	(2.62)	(2.77)	(2.66)	(2.35)	(3.17)
Family Rank: High	-23.48	-27.34	-3.85	-34.39	-4.98	29.42**	-46.63**	-28.61	18.02
	(24.18)	(23.73)	(13.79)	(22.85)	(26.02)	(12.51)	(22.95)	(28.42)	(14.31)
Observations	10632	10632	10632	10632	10632	10632	10632	10632	10632
R-squared	0.064	0.124	0.057	0.066	0.125	0.044	0.069	0.130	0.046

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