# Redemption Fees: Reward for Punishment*

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## ABSTRACT

Short-term redemption fees have become increasingly prevalent amongst mutual funds. Mutual funds impose redemption fees with the intent of maximizing the wealth of mutual fund shareholders through discouraging them from engaging in frequent trading activity. This paper empirically analyzes if and how redemption fees achieve this goal. We find that mutual funds with redemption fees outperform their counterparts by 1.0 to 1.4 percent a year. Moreover, performance increases by 0.5 to 2.4 percentage points a year following the initiation of a redemption fee such that the difference in performance between the two groups of funds is indeed attributable to the fee. We find that the fee improves performance through changing portfolio characteristics. Most notably cash holdings decrease by 77 to 102 basis points after fee initiation.



**JEL Classifications: G23 (private financial institutions), G12 (asset pricing)**
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## 1 Introduction

As illustrated in Figure 1, redemption fees have become increasingly prevalent amongst mutual funds. Fund families typically justify levying redemption fees because they will improve returns. For example, Vanguard states that the fee is imposed to protect long-term investors in its funds from the "potentially harmful effects of frequent trading and market timing" which "generally results in higher transaction costs for fund shareholders overall, and may also interfere with a mutual fund advisor's ability to manage the fund,"[5] and Goldman Sachs states that the fee is intended "to offset the trading costs, market impact and other costs associated with short-term money movements in and out of a fund."[6]

Prior research has shown that short-term trading restrictions, such as a lockup period, improve the performance of hedge funds (Agarwal, Daniel, and Naik (2009), Bing (1999), Gokcan and Liang (2007), Liang and Park (2008)). Redemption fees are intended to serve a similar function in mutual funds. However, few studies have explored the impact of redemption fees on investor behavior and fund performance. The purpose of this paper is to examine if and how such fees are effective in this regard.

We make three main contributions to the literature. First, we find that in the cross-section of mutual funds, those with redemption fees outperform their counterparts by 1.0 to 1.4 percent a year, depending on the metric of performance. Second, this increase in performance is likely attributable to changes in portfolio composition rather than simply a preference for redemption fees by high quality managers. Third, we find that the primary change in portfolio composition is

[5] The Vanguard Group, 2005, *Vanguard updates frequent-trading and redemption-fee policies,* https://personal.vanguard.com/us/VanguardViewsArticle?ArticleJSP=/freshness/News_and_Views/news_ALL_tradingpolicy_07052005_ALL.jsp/

[6]; Fran Finnegan & Company, 2008, http://www.secinfo.com/ 2008(d) Goldman Sachs Trust · N-14AE On 11/30/04 · EX-17.(O)

a decrease in the proportion of a fund's portfolio held in cash by 77 to 102 basis points after fee initiation.

In section 2, we provide a theoretical argument in favor of redemption fees. In section 3, we describe the data we examine in our study to test this theory. In section 4, we detail our methods of empirical analysis. In section 5, we discuss our results. In section 6, we conclude with the practical implications of our findings.

## 2 Why Should Funds with a Redemption Fee Outperform?

Dellva and Olson (1998) explain that mutual fund managers typically meet investor redemptions through holding cash or liquidating securities. By holding cash, they bear the opportunity cost of forgone participation in markets for risky assets. To elaborate, a fund's exposure to a given risk premium will be reduced by the percentage of its portfolio that is held in cash. Chordia (1996) found that cash holdings increase by 0.697% for every percentage increase in nine-month moving average variance redemption rates. More recently, Yan (2006) discovered a positive and statistically significant relationship between cash holdings and flow volatility. Intuitively, this is because greater flow volatility results in a lower probability of meeting investor redemptions through cash balances and cash is a manager's preferred source of capital for meeting redemptions.

If a fund cannot meet redemptions through its cash balance, it normally liquidates securities[7]. By liquidating securities, funds bear transaction and administrative costs, which result in considerable losses to all investors. Gastineau (2004) finds that around 35% of all mutual fund trades are liquidity motivated. Meeting redemptions through the liquidation of securities involves

[7] Other less frequently used options to meet investor redemptions include delivering redemptions in kind or paying a provider of liquidity management services, such as ReFlow, to purchase shares in the fund to offset redemptions.

significant transaction costs (Edelen, Evans, and Kadlec, 2007) and reduces performance by forcing sales of potentially underpriced securities[8]. The transaction costs consist of brokerage commissions, bid-ask spreads, and, perhaps most notably, price impact. These costs may lead funds to prefer more liquid securities during periods of high expected market volatility (Huang, 2008). Greene, Hodges, and Rakowski (2007) find that redemption fees tend to be more prevalent among small-cap, less liquid funds. Liquidating securities also results in an administrative cost associated with management's time, which would otherwise be spent on market research. Edelen (1999) shows that associated administrative expenses and brokerage commissions each contribute around 30 basis points to the liquidity feature's reduction in returns, while the remainder can be attributed to an adverse selection cost (Grossman and Stiglitz (1980) and Kyle (1985))[9].

Given the cost of providing unlimited liquidity to fund shareholders, funds may impose a redemption fee to reduce adverse selection of short-term traders into their funds[12]. Redemption fees create a separating equilibrium where investors who will impose high liquidity costs (i.e., short-term traders) avoid investing in a fund with a redemption fee, while those who will impose low liquidity costs (i.e., long-term investors) will invest in a fund with a redemption fee. The long-term investors self-select into funds with redemption fees in order to protect themselves against transferring wealth to short-term traders. With one exception, this theory is

[8] See, for example, Coval and Stafford (2007) and Rakowski (2010) for additional evidence of the significant costs associated with liquidity-motivated trading.

[9] The adverse selection cost associated with liquidity-motivated trades is articulated in Alexander, Cici, and Gibson (2006). Through forming portfolios based on the flows and portfolio transactions of individual mutual funds and comparing the performance of these portfolios to their benchmark indices, the authors discover that valuation-motivated sells underperformed by 0.66% while liquidity-motivated sells outperformed by 1.55% in the following year. This implies that the adverse selection cost associated with liquidity acquisition is economically important.

[12] Front-end loads may also discourage short-term traders despite their primary purpose being to compensate brokers. Such fees, however, should be expected to be less effective in reducing redemptions than back-end loads and redemption fees because they represent a sunk cost. Additionally, Greene, Hodges, and Rakowski (2007) find that funds with front-end loads have significantly higher fund flows and dilution than those without such fees, which suggests that the front-end load is not effective at reducing redemptions.

elegantly espoused in Nanda, Narayanan and Warther (2000); per SEC rule 22c-2, redemption fees must be retained by the fund itself and are not revenue to the asset management firm representing the investment (although the authors claim that this will not change the equilibrium outcomes)[13]. The impact of the fee on long-term investors is touched on by Dellva and Olson (1998). The authors conduct a broad analysis of the impact various fees render on mutual fund performance and find that the impact of the redemption fee is positive and significant at the 1% level across multiple measures of risk-adjusted performance.

## 3 Data

Our sample includes all open-end US equity mutual funds in the intersection of the Center for Research in Security Prices (CRSP) Survivor Bias-Free US Mutual Fund database and the Thomson CDA/Spectrum Mutual Fund Holdings database over the period spanning January 2001 to December 2009. Following the prior literature, we identify US equity mutual funds by the investment objective that is stated in their prospectus as documented by Lipper. Specifically, we classify funds with a Lipper objective code of equity income (EI), growth (G), growth and income (GI), mid-cap (MC), micro-cap (MR), small-cap (SG) or S&P 500 index objective (SP) as US equity mutual funds. Specialty funds (such as sector funds) are excluded from the analysis. Focusing strictly on US equity mutual funds serves three primary purposes. First, it allows us to benchmark fund performance against risk factors established in the literature without having to take a stand on the relevant benchmark for international markets. Second, we have the ability to examine in depth the impact of redemption fees on the portfolio composition of this sample of

[13] The fact that redemption fees are returned to the fund implies a mechanical positive relationship between the existence of a redemption fee and fund returns. For example, a redemption of $100 subject to a redemption fee of 2% would add $2 to the returns of existing investors. However given the magnitude of our estimated impact of redemption fees on fund performance, we conclude that this explanation alone is implausible. Back of the envelope calculations presented in Section 6.c expound further on this point.

mutual funds because Thomson only provides data on US and Canadian stocks. These disclosures are required quarterly by the SEC post-2003. Before 2003, disclosures were required semi-annually, but approximately 60% of funds disclosed at a quarterly basis. Third, our study focuses on a large section of the mutual fund industry. Data from Morningstar Direct shows that, as of the end of 2011, 41.49% of aggregate mutual fund assets were held in US stock funds. Additionally, Sialm and Starks (2012) find that 24.85% of mutual fund assets are held in defined contribution plans. This suggests that a considerable portion of fund shareholders are long-term investors. Additionally, Chen and Poon (2008) show that the US stock market is one of the most liquid markets in the world. Therefore, evidence of a performance premium for funds with redemption fees in this relatively liquid market would likely imply that such a premium exists in less liquid markets as well. The converse is not necessarily true.

We first note that redemption fees are quite homogeneous across share classes within a mutual fund. Consider the panel of fund-month observations in which at least one of the offered share classes has a redemption fee, 11.72% of these fund-months have variation in the existence of a redemption fee across share classes (for example, one share class had a redemption fee while another did not). Additionally, only 1.12% of these fund-months have variation in the duration, which is the amount of time since purchase during which an investor would be subject to the fee, or magnitude of the fee across share classes (for example, one share class had a redemption fee of 1% for a duration of 3 months and another had a redemption fee of 2% for a duration of 2 months). To better investigate this difference in our sample and to avoid overweighting funds with multiple share classes having the same redemption fee policy, we therefore conduct our analysis by aggregating the individual share class data to the portfolio level by value-weighting fund characteristics in month t by total net assets reported at the end of month t-1 following

Kacperzczyk, Sialm and Zheng (2007). Moreover, we would expect this strategy to yield sharper inference in that funds with variation in redemption fees across share class are less likely to have multiple clienteles that would muddle discernible differences in fund characteristics and portfolio composition. After dropping 13 funds with tiered redemption fees, 463 funds in which some but not all share classes have a redemption fee and 40 funds in which the redemption fee structure varies across share classes, we are left with 3,105 distinct mutual fund portfolios and 257,598 fund-month observations.

For each of these fund-months, we define our variables of interest as reported in Appendix 1. Moreover, we winsorize expense ratio and total net assets at the 1st percentile to eliminate negative values. Fund flow and turnover ratio are winsorized at the 1% tails. Finally, cash holdings and Amihud ratio are winsorized at the 99th percentile.

We first document changes in the prevalence of redemption fees over our sample period followed by a characterization of the differences between funds with a redemption fee and those without a redemption fee. Table I reports descriptive statistics. Panel A shows the percentages of funds in our sample that impose redemption fees. The proportion of funds with a redemption fee more than doubled between 2002 and 2004 in the wake of the market timing scandal and subsequently declined from a high of 28% in 2007 to 24.5% in 2009. As illustrated in Figure 1, the majority of the growth occurred during 2004, where the percentage of funds with the fee increased by 78%.

Panels B and C focus specifically on funds that impose a redemption fee. Panel B shows the percentage of funds with redemption fees of various magnitudes. There was a rapid increase in funds imposing a redemption fee of 2% (the SEC-imposed cap) between 2003 and 2005 followed by a sharp decline in the number of funds imposing higher redemption fees. The

number of funds imposing a redemption fee of 1.5% or more declined by 43% between 2005 and 2009, while the number of funds imposing a redemption fee below 1.5% declined by only 1%. Panel C shows the percentage of funds with redemption fees of various durations. Panel C shows that the increase in redemption fees between 2003 and 2005 occurred primarily among funds imposing redemption fees with a duration of less than two months (287% increase versus a 30% increase among funds with longer durations). Comparing the proportion of funds within fund objective categories that have redemption fees (Panel D) indicates that redemption fees are most common among funds that hold the equities of small and micro-cap firms.

Table 2 shows differences in the characteristics of funds with and without redemption fees. Funds that initiate a redemption fee during the sample period are split into with and without fee categories and characteristics reflect the time series median within each category. Funds that impose redemption fees have a significantly higher Amihud (2002) illiquidity measure, hold fewer stocks in their portfolio, and are significantly older. Funds with redemption fees also have a 31 basis points higher average monthly (raw) return than funds that do not have a redemption fee.

Next, we model the probability of the initiation of a redemption fee by a fund in period *t* as a function of fund characteristics in period *t-1*. We hypothesize that because a fund with considerable short-term trading by its investors must hold more cash or experience greater portfolio turnover, funds with greater cash holdings or turnover will be more likely to initiate a redemption fee. Also, because small-cap funds tend to invest in less liquid securities, we expect the impact of high turnover on alpha to be particularly pronounced among such funds. Therefore, we hypothesize that funds with an orientation towards small-cap stocks are more likely to impose a redemption fee. Following Greene, Hodges, and Rakowski (2007) and Nanigian (2011), we

also use expense ratio as a proxy for high conflicts of interest, which may motivate managers of less competitive funds to use the redemption fee as a tool to maximize assets under management. As Ling (2007) explains that funds become more concerned about redemptions as they age, we control for the total net assets of each fund.

Table 3 presents the results from probit regressions modeling the initiation of a redemption fee. In all of our probit regressions, we control for unobservable sample-wide time variation through fixed time effects. We also cluster standard errors by fund family to correct for residual correlation. Panel A presents the marginal effects of a change in the independent variable on the predicted probability of initiation calculated from our panel probit estimates using fund-month observations. For continuous variables, the marginal effect is the average change in predicted probability across our panel for a perturbation of one standard deviation change in the associated independent variable. For binary (dummy) variables, the partial effects are calculated based on a change in the independent variable from 0 to 1 for all observations in our sample. In this specification, we assign the dependent variable a value of 1 if the mutual fund initiated a redemption fee; otherwise, the dependent variable takes the value of 0. Following an initiation event, we drop subsequent observations for funds with a redemption fee. We also exclude funds with less than 12 months of return data prior to the period in which the fee was initiated. Fund characteristics positively related to initiation include size, expense ratio, prior return, illiquidity and investment in small cap stocks. Once liquidity is accounted for in the model (columns 2 and 4), expense ratio is no longer statistically significant. Prior existence of redemption fees by other funds in the same family is strongly related to initiation. Standard

deviation of cash flow, turnover and cash holdings do not appear to be significant determinants of redemption fee initiation.[14]

While this estimation allows us to examine the characteristics associated with redemption fee initiation, the decision to change a mutual fund's fee structure may arguably occur at a lower frequency. For this reason, we also present the results of an estimation using firm-year observations. In this case, we assign the dependent variable a value of 1 if the mutual fund initiates a redemption fee in any month during year *t*; otherwise, the dependent variable takes the value of 0. Fund characteristics are defined as of the end of year *t*-1. Thus, these tests may have less statistical power to detect changes in fund characteristics but may better reflect the realities of setting fee policies in mutual funds. Marginal effects calculated using estimates obtained from fund-year observations are presented in Panel B of Table 3 and indicate that funds with low levels of asset liquidity and that have other funds within the same fund family that impose redemption fees have a higher probability of initiating a redemption fee. For example, having another fund within the same family impose a redemption fee increases the probability of initiation by 3.3 to 3.8%, depending on model specification. In contrast to the firm-month analysis, funds with higher cash holdings also have a higher annual probability of initiating a redemption fee. For example, a one percent increase in cash holdings corresponds to a 0.6 to 0.7% increase in the probability of initiation.

[14] The insignificance of the standard deviation of cash flows is somewhat surprising. One possible reason for this insignificance is that the deviation is calculated using monthly flows, which may smooth short-term variation in fund flows. We, however, do not have access to daily fund flows. Another possibility is that redemption fees affect only redemptions or net outflows. We have rerun our results using the standard deviation of redemptions obtained from Morningstar. This variable is also insignificant, perhaps due to a reduction in observations due to missing data, entry errors present in the data or the data measuring redemptions rather than net outflows, which would better measure real cash needs.

## 4 Methodology

### *a. Risk-adjusted Measures of Fund Performance*

In order to evaluate the performance of mutual funds, which may differ in their exposure to common risk factors, we construct two measures of risk-adjusted mutual fund returns. First, following Carhart (1997), we estimate factor loadings using 36-month rolling windows for the four-factor model using the following time series regression:

$$R_{i,t} - R_{f,t} = \alpha_t + \beta_{i,Mkt}(R_{Mkt,t} - R_{f,t}) + \beta_{i,SMB}R_{SMB,t} + \beta_{i,HML}R_{HML,t} + \beta_{i,UMD}R_{UMD,t} + \varepsilon_t$$

$R_{i,t}$ is the return net of management expenses and 12b-1 fees for fund *i* in month *t*. $R_{f,t}$ is the 1-month US Treasury bill rate in month *t*. $R_{Mkt,t}$ is the return on the CRSP value-weighted index in month *t*. $R_{SMB,t}$, $R_{HML,t}$ and $R_{UMD,t}$ are the returns on the small-minus-big, the high-minus-low and the up-minus-down (momentum) portfolios respectively in month *t*. We thank Kenneth French for making this data available. We exclude funds which have fewer than 24 months of data for this estimation. We then skip a month and use these estimated loadings to calculate a time series of alphas over our sample period, where alpha is given by the following equation:

$$\alpha_{i,t} = R_{i,t} - R_{f,t} - \hat{\beta}_{i,Mkt}\gamma_{Mkt,t} - \hat{\beta}_{i,SMB}\gamma_{SMB,t} - \hat{\beta}_{i,HML}\gamma_{HML,t} - \hat{\beta}_{i,UMD}\gamma_{UMD,t}$$

As in any return-based style analysis, one of the central assumptions of the four-factor model is that factor exposures are stable across the time series. However, in actuality there is often time variation in the factor exposures. Therefore, we also examine objective category average-adjusted return. This is simply the return on a fund in month *t* net of the value-weighted average contemporaneous return on all other funds that follow the same investment objective, as classified by Lipper.

b. *Identification Issues*

One major issue in attributing changes in performance or fund characteristics, such as portfolio composition, to the initiation of a redemption fee is selection bias. Specifically, good managers may attempt to protect their private information and the performance generated by this information from short-term traders by creating a disincentive for short-term trading through the initiation of a redemption fee. Thus, the estimates we obtain may simply pick up a difference in manager quality or the presence of private information rather than the liquidity costs generated by short-term traders and the accommodation of their demands through managing fund characteristics, such as cash holdings or turnover ratio. In this subsection, we discuss in detail three strategies that we use to attempt to mitigate this selection bias, namely: our event study methodology, alternative event definitions, and fund-level fixed effects models.

*i. Event Study Methodology*

Our first strategy centers on obtaining difference-in-difference estimates around the initiation of a redemption fee. For each fund in our sample which initiates a redemption fee, we obtain a control firm by minimizing the absolute difference in *p*-score, or the predicted probability of initiating a redemption fee from our probit analysis using firm-month observations presented in Table 3, between the initiating (treatment) fund and the control fund. We also utilize two additional criteria to improve our match quality: that both firms belong to the same Lipper investment objective category and that the control fund does not initiate a redemption fee at any time during our sample period. Our regression for the *(t-h, t+h)* event window then takes the following form:

$$Y_{i,t} = X_{i,t}\beta + \delta_0 + \delta_1 * \text{Post} + \delta_2 * \text{Treament} + \delta_3 * \text{Post} * \text{Treatment}$$

$Y_{i,t}$ is the performance metric or portfolio characteristic for fund *i* in month *t* for which we are interested in obtaining an estimate of the impact of a redemption fee. $X_{i,t}$ is an optional vector of additional fund specific controls. *Post* is a dummy variable equal to 1 if the observation occurs between the month of initiation (month *t*) and month *t+h* and equal to 0 otherwise. *Treatment* is a dummy variable equal to 1 if the fund is in the sample of funds initiating a redemption fee and equal to 0 if the fund is in the control sample. $\delta_3$ is the difference-in-difference estimator.

For portfolio characteristics that exhibit autocorrelation such as cash holdings that are reported on an annual basis, we follow the residual aggregation methodology of Bertrand, Duflo, and Mullainathan (2004). Specifically, we define two observations for each fund, a pre- and post-period observation, as follows:

$$\bar{\varepsilon}_{i,Pre} = \frac{1}{h}\sum_{j=t-h}^{t-1} \hat{\varepsilon}_{i,j};\ \bar{\varepsilon}_{i,Post} = \frac{1}{h+1}\sum_{j=0}^{t+h} \hat{\varepsilon}_{i,j}$$

In this case, $\hat{\varepsilon}_{i,t}$ is the predicted residual from the panel regression of $Y_{i,t}$ on objective code and time fixed effects as well as an optional vector of additional firm specific controls. We then test the following null hypothesis:

$$\bar{\varepsilon}_{i,Pre} - \bar{\varepsilon}_{i,Post} = 0.$$

*ii. Alternative Event Definitions*

An argument can be made that because good fund managers care about their shareholders, they are more likely to impose redemption fees. However, because good fund managers also happen to exert greater effort in security selection, outperformance among funds that have a redemption fee may be ultimately attributable to the quality of the

manager rather than the redemption fee. We explore three alternative event definitions in an effort to disentangle the selection of managers into redemption fees from the impact of redemption fees themselves on fund performance and portfolio composition. The first such alternative event is the case of initiations which may be mandated by policies in place at the fund-family level. We refer to such events as follow-on initiations. Specifically, an initiation event is considered to be "follow-on" if another fund within the same fund family also initiated a redemption fee within the prior 12 months. Follow-on initiations comprise 92 out of the 474 initiation events observed in our sample. The type of initiation event (follow-on vs. original initiation) may be exogenous (dictated by the management company) rather than endogenous (good managers self-selecting into redemption fees) and thus may provide better estimates as to the impact of redemption fees on performance. To provide support that these follow-on initiations may be exogenous, consider the following. First in Table 3, we find that prior within family redemption fee initiations are highly correlated with the subsequent initiation of a redemption fee by a specific fund. Our estimates suggest that a prior initiation is the strongest predictor of the initiation of a redemption fee within our panel of regressors. Funds in families which recently initiated redemption fees have a predicted probability of initiating roughly twice as large as their counterparts in fund families without recent initiations. Second, there is anecdotal evidence that redemption fee policies are set by mutual fund families rather than individual mutual funds. For example, *MarketWatch* reports in 2005 that "Federated Investors, one of the companies implicated in the mutual-fund trading scandal, is adding redemption fees to nine funds to combat short-term trading.[15]"

[15]O'Donnell , K. (2004). Federated adds redemption fees: Move to deter rapid trades of international, bond funds.

The second alternative event that we investigate is manager turnover among funds with a redemption fee. For example, if positive performance is due to managerial skill or if lower cash holdings are due to managerial preference rather than the presence of a redemption fee, we would expect to observe a reversal in the estimated effects of a redemption fee initiation when the manager in place at the time of initiation left holding the presence of a redemption fee constant. In our sample, we observe 269 managerial turnovers where the redemption fee stayed in place despite the change in management. For these results, we avoid specifically modeling manager turnover in favor of simply adjusting fund specific variables for time and objective code effects.

The third alternative event that we investigate is the removal of a redemption fee. In our sample, 301 funds drop their redemption fee after initiation. This removal occurs on average 27.9 months after initiation. Thirty-eight of these funds later reinitiate a redemption fee. We exclude observations following this reinitiation in order to isolate the effects of not having a redemption fee after such a fee has been in place. As in the case of managerial turnover, we avoid specifically modeling the decision to remove a redemption fee and simply adjust fund specific variables for time and objective code effects. We would anticipate the changes to fund characteristics following the initiation of a redemption fee to reverse following the removal of such a fee.

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*The Wall Street Journal*, Retrieved from http://www.marketwatch.com/story/federated-adds-redemption-fees-to-certain-funds

### *iii. Fund-level Fixed Effects Estimates*

There may be concern that our results are specific to the event windows that we choose or the specific model of redemption fee initiation that generates our *p*-scores and subsequent matches. To assuage these concerns, we also re-estimate our panel regressions using fund-level fixed effects in addition to our previously used control variables and time fixed effects in order to isolate the incremental impact of a redemption fee on fund-specific characteristics within a specific fund. The validity of these results hinge on the ability of our controls to capture differences in preferences (or ability) across managers, but within the same fund, or the notion that mutual funds characteristics reflect the preferences of their investors and that this clientele does not vary through time.

## 5 Results

In this section, we present the main results of our paper. First, we document that funds with a redemption fee outperform funds without a redemption fee in the cross-section of mutual fund returns after adjusting for risk. Next, using event study tests and fund-level fixed-effect regressions, we provide evidence that this performance gain is consistent with the initiation of a redemption fee rather than an omitted variable. Finally, we explore potential changes in portfolio composition and fund characteristics that may explain in part the estimated performance differential.

### *a. Do Funds with a Redemption Fee Outperform in the Cross-section?*

We begin our discussion of the main results with an examination of the predictive regressions of fund performance, conveyed in Table 4. Funds with redemption fees outperform

funds without a redemption fee by 8 to 11 basis points per month after controlling for a broad variety of fund characteristics as well as the fund's underlying exposure to risk (Table 4, columns 1-4). The superior performance of funds with a redemption fee is robust to both four-factor alpha and objective-adjusted return (columns 6-7)). Funds with redemption fees outperform funds without a redemption fee by a similar magnitude when performance is modeled using different econometric techniques (panel and Fama-MacBeth), and different holding periods (monthly, quarterly and annual). Arguably, if a fund that initiates a redemption fee belongs to a family in which another fund initiated a redemption fee within the previous 12 months, it is likely that its decision to initiate the fee was made by executives of the investment company that operates the fund rather than a fund manager. These funds exhibit comparable (11 basis points per month) excess performance (column 4).[16]

### *b. Are Redemption Fees a Proxy for Good Management?*

As discussed in the Methodology Section, the presence of a redemption fee may simply be serving as a proxy for an omitted variable, such as managerial quality, rather than our estimated performance gains being directly attributable to the presence of a redemption fee itself. To provide additional insights into the impact of redemption fees on fund performance, we conduct a series of event study tests on changes to performance following the initiation of a fee. As an alternative specification, we also estimate the regressions in Table 4 using fund-level fixed-effects in an effort to absorb time-invariant omitted variables specific to a given fund.

Table 5 compares fund performance before and after redemption fee initiation after controlling for time effects and similar fund characteristics using a matched sample. Initiators are

[16] If redemption fees reduce fund flows, then the improved performance for funds with a redemption fee may be due to a reduction in fund flows (increase in fund outflows) as in Berk and Green (2004). In unreported results, we additional control for fund flows; our estimates are quantitatively similar.

matched with funds in the same objective category that have a similar predicted probability of initiation based on our probit estimates. We also compare performance among funds that initiate a redemption fee following the imposition of fees within the same fund family in order to isolate funds that are more likely to have been follow-on initiations of redemption fees and thus less likely to be of better quality. Funds achieve higher performance in general after redemption fees are imposed. The monthly excess performance among funds that initiated redemption fees after another fund within the same family initiated a redemption fee is 9 to 14 basis points higher, depending on event window specification, than funds that may have had more discretion over the initiation decision. For these funds, annual alphas among funds with family-motivated initiations are 1.9% higher in the four years following redemption fee initiation than in the four years prior to initiation. Three- and five-year annual alphas are even larger (2.1% and 2.4%) among funds with family-motivated initiations. An integral implication of these difference-in-difference tests is that the improvement in performance associated with a redemption fee is not likely attributable to the ability or effort of fund management. Rather, it is likely due to the curbing of short-term trading by fund investors and also possibly the augmentation of a fund's net asset value from the collection of redemption fees.

To further test whether excess performance may be attributed to the selection of redemption fees by better quality fund managers, Panel B of Table 5 compares performance before and after a change in fund management among funds that had a fee in place both before and after the change. Funds with manager turnover exhibited annualized excess returns of between 1.1 and 1.6 percent after the replacement of the fund manager, depending on event window and regression model specification. Because the excess returns following the replacement of the fund manager are not negative, this second set of event studies provides

further evidence in opposition to the belief that the positive association between redemption fees and performance is merely a result of managerial quality.

Finally, Panel C of Table 5 explores the impact of removing a redemption fee on fund performance. For the two longer event windows, performance reversals are of similar magnitude as the performance increases (columns (1) and (5) of Panel A). However, we are unable to control for the potential selection problem of redemption fees that are less effective at dissuading short-term trading being the redemption fees that are removed.

Additional insights into the possibility that managerial quality drives the performance differential between funds with redemption fees and those without are gleaned from a set of predictive regressions of fund performance. The results from these fixed-effects regression involving monthly, quarterly, and annual returns are conveyed in Table 6.[17] The implications of this analysis are consistent with those of the event study, with economically significant effects only apparent among funds with follow-on initiations. For example, in the objective category adjusted annual return regressions, the coefficient on *Follow-on* corresponds to a 2.5% increase in annual returns while the coefficient on *Redemption Fee* is indistinguishable from zero.[18]

### *c. What Drives the Performance Gap?*

Perhaps, the simplest potential explanation of the performance gains observed in funds with a redemption fee is that revenue generated from these fees is driving the estimated change in performance. However, this is unlikely due to the magnitude of the

[17] As in the previous section, we find quantitatively similar results when fund flows are included as an additional control variable. These results are untabulated but available from the authors upon request.

[18] We have also explored specifications that explore the impact of redemption fees on performance along both the dimension of redemption fee magnitude and duration. However, our results suffer from a lack of power in that redemption fee initiations are clustered at the regulatory cap of 2%. Specifically of the 474 redemption fee initiations in our sample, the majority (81.7 percent) are imposed over a duration of less than or equal to 2 months. Moreover, 73.6 percent of initiations are imposed at the regulatory cap of 2% for duration of less than or equal to 2 months. These results are available from the authors upon request.

performance differential that we estimate in Tables 4 and 5. Consider the conservative estimate of 8 basis points per month, or 96 basis points annually, presented in Table 4. In order to fully explain the performance gain, the fund would need to experience at least 4% of its total net assets in redemptions per month assuming a redemption fee of 2%, equal to the regulatory maximum.[19] This figure serves as a lower bound for such redemptions with revenue being sufficient to explain performance only if all redemptions were subject to the redemption fee, i.e. all redeemed positions had holding periods less than the duration of the redemption fee, and the fund incurred no costs in turning over its portfolio to meet such high redemptions, i.e. in the case of inflows exactly offsetting redemptions. Using data on fund redemptions collected by Morningstar from SEC N-SAR reports and survey data, the average fund with a redemption fee experiences redemptions of 3.5% of total net assets each month over our sample period, which is below our conservative lower bound. Thus, we devote the remainder of this subsection exploring other changes in portfolio composition and fund characteristics that could help explain our estimated performance gain.

Table 7 investigates first-order effects that may be driving excess performance in funds following redemption fee initiation. Panel A compares pre- and post-initiation fund characteristics. Funds that impose redemption fees hold 0.7 to 1.0 percent less of their portfolio in cash during the three- and four-year period after initiation than they held prior to initiation, depending on regression model specification. There is also a statistically significant (at least at the 1 percent level) decrease in fund flow following redemption fee initiation. These findings

[19] 0.08% / 2% = 4.0%.

suggest that the fee is a strong deterrent to short-term trading by fund investors and the fee resultantly reduces funds' precautionary reserve of cash.

When we restrict our sample of events to only "follow-on initiations", there is a significant 1.5 to 1.9 percentage point decline in cash holdings following the initiation event, depending on model specification. However, a significant decline in fund flow is not apparent, which may simply be due to a smaller sample of observations (92 vs. 474). In a matched sample of funds with the same probability of initiating redemption fees, there is no significant decrease in cash holdings. Among funds with management turnover that had a fee in place both before and after the change in management, we see no difference in fund characteristics following the change. This is consistent with our prior tests involving management turnover.

Our estimates of changes in fund characteristics following the removal of a redemption fee largely fail to pick up any significant effects. For example, cash holdings and turnover ratio both increase after the removal of a redemption fee as one would expect; however, these effects are not statistically significant. This may be due to a lack of power in the residual aggregation technique of Bertrand, Duflo and Mullainathan (2004), the lack of a specific model for the removal of a redemption fee in the first stage of our estimation, or the possibility that funds with redemption fees that have little impact may often be the funds that remove the fee. We do observe a statistically significant decrease in fund flows following the removal of a redemption fee. Following removal, fund flows are between 0.5% and 1.1% lower than at the time a redemption fee was in place. While the direction of this effect is in the same direction as the effect observed when a redemption fee is initiated, it is consistent with long-term investors perceiving the removal of a redemption fee as a negative signal that fund management is not acting in their best interests.

Table 8 shows how the characteristics of funds with the fee differ from those without the fee. It shows fund fixed-effect regressions on illiquidity, cash holdings, turnover ratio and fund flow after redemption fee initiation. This lends credence to the belief that the fee impacts the liquidity preference of fund management. Moreover, we find evidence of a decrease in the percentage of the portfolio held in cash that is similar to our estimates in Table 7. After controlling for fund-level fixed effects, cash holdings decrease by 0.56% when a fund has a redemption fee in place. This reduction more than triples to 1.77% when we restrict our attention to the set of follow-on initiations.

## 6 Conclusion

This paper examines the determinants and implications of short-term redemption fees in mutual funds following the 2003 market timing scandal that led to a dramatic increase in the percentage of mutual funds imposing these fees. We find evidence that fund illiquidity is positively related to the probability of initiating redemption fees. Over the period spanning January 2001 to December 2009, funds with redemption fees outperformed their counterparts by at least one percentage point per year. The improvement in performance following redemption fee initiation appears to have been most acute among funds that were exogenously pressured into imposing redemption fees by their fund family, suggesting that our estimate is not simply due to higher quality managers choosing to impose the fee. The increase in performance following redemption fee initiation can be attributed to a decline in cash. Funds that impose redemption fees significantly reduce cash holdings in the three-, four-, and five-year period following initiation, even among funds that may have been pressured into initiating fees by the fund family.

These results provide evidence that mutual fund redemption fees allow fund managers to reduce the wealth transfer from long-term to short-term shareholders created through the provision of costless liquidity. Funds that initiate redemption fees provide long-run investors with higher average performance by reducing cash holdings and increasing opportunities to invest in less liquid securities. The redemption fee may provide a signal that a fund caters to long-run investors, resulting in clientele effects among mutual funds.

There are extensions for future research resulting from our study. First, the impact of redemption fees on fund performance and related fund characteristics may be stronger in markets without a government-imposed cap on the fee. Another avenue that is ripe for exploration is the effectiveness of other liquidity-curbing mechanisms, such as round-trip trade rules and lock-up provisions.

# Appendix

**Description of independent variables used in the regressions**

| Variable | Description |
|---|---|
| Standard deviation of cash flow | The standard deviation of the last 12 months of fund flow. |
| Adjusted return | The net return on a fund in excess of the average return on all funds in its objective category. |
| Expense ratio | The average annual expense ratio. |
| Turnover ratio | The average annual total asset turnover, defined as the minimum of either aggregated security purchases or sales divided by average total net assets. |
| Log total net assets | The logarithm of the total net assets of a mutual fund. |
| Small | Dummy variable indicating that a fund follows either a small- or micro-cap investment objective. |
| Amihud | The value-weighted mean of the Amihud (2002) illiquidity measure across all of a fund's stock holdings subject to 13f filing requirements. |
| Percent Cash | The percentage of a fund's portfolio held in cash. |
| Redemption fee | Dummy variable indicating that a fund has a redemption fee. |
| Prior initiation in fund | Dummy variable indicating that another fund in the a fund's family has initiated a redemption fee over the last 12 months |
| Follow-on | Dummy variable indicating that a fund has a redemption fee and other funds in a fund's family have initiated a redemption fee over the last 12 months. |
| Front load | The ratio of a fund's maximum sales charge to the total assets of the fund. |
| Size | The value-weighted average market capitalization of a fund's stock holdings subject to 13f filing requirements scaled by 1e12. |
| Age | The number of years since a fund was first offered to investors. |
| STD Returns | The standard deviation of the last 12 months of a fund's net returns. |
| 12b1 | The ratio of marketing and distribution costs to the total assets of a fund. |

**References**


Agarwal, V., N. D. Daniel, and N. Y. Naik, 2009, Role of managerial incentives and discretion in hedge fund performance, *The Journal of Finance* 64, 2221–2256.

Alexander, G. J., G. Cici, and S. Gibson, 2007, Does motivation matter when assessing trade performance? an analysis of mutual funds, *Review of Financial Studies* 20, 125–150.

Amihud, Y., 2002, Illiquidity and stock returns: cross-section and time-series effects, *Journal of Financial Markets* 5, 31–56.

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

Bertrand, M., E. Duflo, and S. Mullainathan, 2004, How much should we trust differences-in-differences estimates?, *Quarterly Journal of Economics* 119, 249–275.

Bhargava, R., and D. A. Dubofsky, 2001, A note on fair value pricing of mutual funds, *Journal of Banking and Finance* 25, 339–354.

Carhart, M., 1997, On persistence in mutual fund performance, *The Journal of Finance* 52, 57–82.

Chalmers, J. M., R. M. Edelen, and G. B. Kadlec, 2001, On the perils of financial intermediaries setting security prices: the mutual fund wild card option, *The Journal of Finance* 56, 2209–2236.

Chen, J., H. Hong, M. Huang, and J. D. Kubik, 2004, Does fund size erode mutual fund performance? the role of liquidity and organization, *The American Economic Review* 94, 1276–1302.

Chen, S., and S. Poon, 2007, International stock market liquidity and financial crisis, *Working Paper*.

Chordia, T., 1996, The structure of mutual fund charges, *Journal of Financial Economics* 41, 3–39.

Coval, J., and E. Stafford, 2007, Asset fire sales (and purchases) in equity markets., *Journal of Financial Economics* 86, 479–512.

Dellva, W. L., and G. T. Olson, 1998, The relationship between mutual fund fees and expenses and their effects on performance, *Financial Review* 33, 85–104.

Dickson, J. M., J. B. Shoven, and C. Sialm, 2000, Tax externalities of equity mutual funds., *National Tax Journal* 53, 607–628.

Edelen, R. M., 1999, Investor flows and the assessed performance of open-end mutual funds, *Journal of Financial Economics* 53, 439–466.

——— , R. Evans, and G. B. Kadlec, 2007, Scale effects in mutual fund performance: The role of trading costs, *Working Paper*.

Fama, E. F., and K. R. French, 2001, Disappearing dividends: Changing firm characteristics or lower propensity to pay?, *Journal of Financial Economics* 60, 3–43.

Fama, E. F., and MacBeth J., 1971, Risk, return, and equilibrium, *The Journal of Political Economy* 79, 30–55.

Gastineau, G. L., 2004, Protecting fund shareholders from costly share trading, *Financial Analysts Journal* pp. 22–32.

Goetzmann, W. N., Z. Ivković, and K. G. Rouwenhorst, 2001, Day trading international mutual funds: Evidence and policy solutions, *Journal of Financial and Quantitative Analysis* 36, 287–309.

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

——— , and D. A. Rakowski, 2007, Daily mutual fund flows and redemption policies, *Journal of Banking & Finance* 31, 3822–3842.

Grossman, S. J., and J. E. Stiglitz, 1980, On the impossibility of informationally efficient markets, *The American Economic Review* 70, 393–408.

Huang, J., 2008, Dynamic liquidity preferences of mutual funds, *Working Paper*.

Kacperczyk, M., C. Sialm, and L. Zheng, 2007, Industry concentration and mutual fund performance, *Journal of Investment Management* 5, 50–64.

Kyle, A. S., 1985, Continuous auctions and insider trading, *Econometrica* 53, 1315–1335.

Liang, B., 1999, On the performance of hedge funds, *Financial Analysts Journal* 55, 72–85.

——— , and H. Park, 2007, Risk measures for hedge funds: a cross-sectional approach, *European Financial Management* 13, 333–370.

Ling, L., 2007, A life cycle analysis of performance and growth in the mutual fund industry, *Working Paper*.

Nanda, V., M. P. Narayanan, and V. A. Warther, 2000, Liquidity, investment ability, and mutual fund structure, *Journal of Financial Economics* 57, 417–443.

Nanigian, D., 2011, Why do mutual fund expenses matter?, *Working Paper*.

Newey, W. K., and K. D. West, 1987, A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix, *Econometrica* 55, 703–708.

Peterson, J. D., P. A. Pietranico, M. W. Riepe, and F. Xu, 2002, Explaining after-tax mutual fund performance, *Financial Analysts Journal* 58, 75–86.

Rakowski, D., 2010, Fund flow volatility and performance, *Journal of Financial and Quantitative Analysis* 45, 223–237.

Sialm, C., and L. Starks, 2011, Mutual fund tax clienteles, *The Journal of Finance* forthcoming.

Yan, X. S., 2006, The determinants and implications of mutual fund cash holdings: Theory and evidence, *Financial Management* 35, 67–91.

Zitzewitz, E., 2003, Who cares about shareholders? arbitrage-proofing mutual funds, *Journal of Law, Economics, and Organization* 19, 245–280.

**Figure 1:** Percentage of Mutual Funds with a Redemption Fee

This figure illustrates the percentage of US equity mutual funds, excluding specialty funds, with redemption fees during each month in our full sample period spanning January 2001 through December 2009.

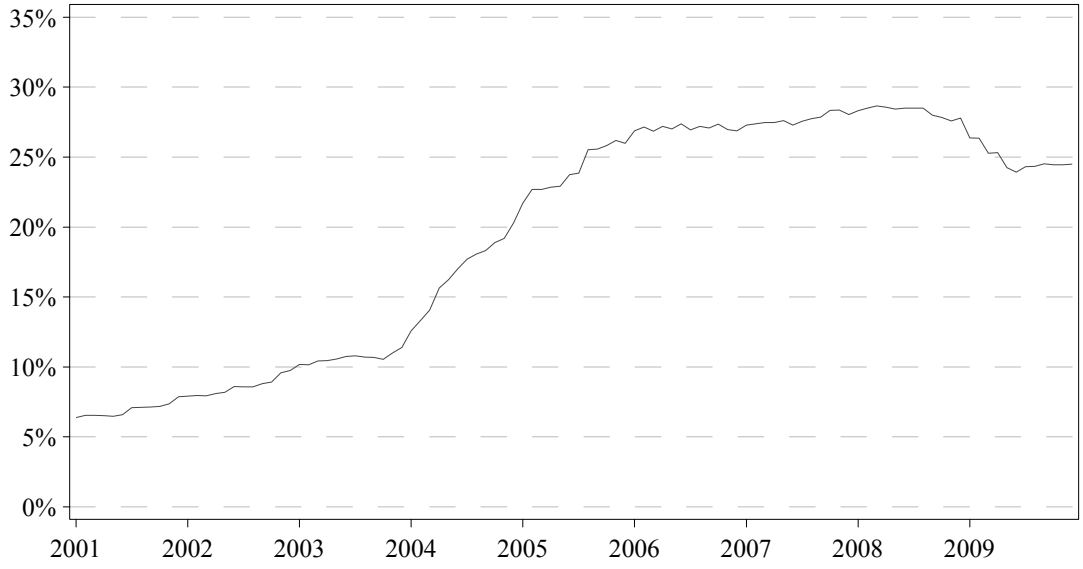

**Table 1:** Summary Statistics

This table reports summary statistics on all US equity mutual funds excluding specialty funds that appear in the intersection of the CRSP Survivor-Bias-Free US Mutual Fund Database and the Thomson-Reuters Mutual Fund Holdings Database. Our full sample period spans from January 2001 to December 2009. Number of funds and percentage of such funds in the sample are reported. Yearly numbers are reported as of the end of December in that year. Panel A presents the number and percentage of funds with a redemption fee in each year. Panel B categorizes the funds with redemption fees by fee percentage in each year. Similarly, Panel C categorizes such funds by the number of months since purchase during which an investor would be subject to the fee. Panel D presents the average number and percentage of funds with and without a redemption fee by investment objective.

*Panel A: Funds with a Redemption Fee*

| | Number of funds with a redemption fee | Total funds in universe | Percentage of funds with a redemption fee |
|---|---|---|---|
| 2001 | 194 | 2,465 | 7.9% |
| 2002 | 239 | 2,453 | 9.7% |
| 2003 | 276 | 2,422 | 11.4% |
| 2004 | 489 | 2,411 | 20.3% |
| 2005 | 618 | 2,379 | 26.0% |
| 2006 | 606 | 2,255 | 26.9% |
| 2007 | 593 | 2,115 | 28.0% |
| 2008 | 539 | 1,939 | 27.8% |
| 2009 | 417 | 1,702 | 24.5% |

*Panel B: Redemption Fees by Magnitude*

| | <0.50% | 0.50-0.99% | 1.0-1.49% | 1.50-1.99% | 2.00% |
|---|---|---|---|---|---|
| 2001 | 8 | 55 | 59 | 19 | 53 |
| 2002 | 7 | 57 | 70 | 16 | 89 |
| 2003 | 7 | 59 | 76 | 17 | 117 |
| 2004 | 5 | 54 | 82 | 13 | 335 |
| 2005 | 5 | 48 | 91 | 16 | 458 |
| 2006 | 4 | 43 | 124 | 16 | 419 |
| 2007 | 4 | 43 | 129 | 16 | 401 |
| 2008 | 4 | 42 | 113 | 16 | 364 |
| 2009 | 3 | 41 | 98 | 11 | 264 |

**Table 1:** Summary Statistics (cont.)

*Panel C: Redemption Fees by Duration (in months)*

| | <2 | 2 | 3 | 4 | 6 | 12 | >12 |
|---|---|---|---|---|---|---|---|
| 2001 | 58 | 17 | 44 | 4 | 41 | 0 | 15 |
| 2002 | 88 | 21 | 56 | 3 | 44 | 0 | 12 |
| 2003 | 101 | 29 | 68 | 7 | 47 | 0 | 11 |
| 2004 | 267 | 73 | 74 | 8 | 43 | 0 | 13 |
| 2005 | 391 | 70 | 83 | 7 | 38 | 0 | 21 |
| 2006 | 387 | 69 | 81 | 5 | 33 | 0 | 24 |
| 2007 | 357 | 79 | 97 | 5 | 27 | 0 | 21 |
| 2008 | 311 | 83 | 88 | 5 | 26 | 0 | 22 |
| 2009 | 226 | 69 | 73 | 5 | 21 | 0 | 20 |

*Panel D: Redemption Fees by Lipper Classification Code*

| | With Fee | | Without Fee | |
|---|---|---|---|---|
| | Number of Funds | Percentage of Funds | Number of Funds | Percentage of Funds |
| Equity Funds | 147 | 4.7% | 373 | 12.0% |
| Equity Income Funds | 23 | 0.7% | 82 | 2.6% |
| Growth Funds | 256 | 8.2% | 783 | 25.2% |
| Growth and Income Funds | 117 | 3.8% | 377 | 12.1% |
| Micro-Cap Funds | 24 | 0.8% | 17 | 0.5% |
| Mid-Cap Funds | 89 | 2.9% | 247 | 8.0% |
| S&P 500 Index Funds | 10 | 0.3% | 29 | 0.9% |
| Small-Cap Funds | 174 | 5.6% | 357 | 11.5% |

**Table 2:** Characteristics of Mutual Funds

This table compares characteristics of US equity mutual funds (excluding specialty funds) that impose redemption fees with those that do not. Results are for the cross-sectional comprised of the time-series median for each fund over our full sample period spanning January 2001 to December 2009. We report the difference in cross-sectional mean values and associated *p*-values between funds with redemption fees and those without redemption fees. *Assets* is the average total net assets in millions of dollars. *Return* is the average net monthly return. *Monthly Fund Flow* is TNA - lag(TNA)*(1+return) - flows attributable to mergers scaled by lag(TNA). *# of Stocks Held* is the number of stocks in a fund's portfolio subject to 13f filing requirements. Other variables are defined in the appendix.

| | | With Fee | Without Fee | Difference | *p*-value |
|---|---|---|---|---|---|
| Assets | Mean | 795.4938 | 996.1098 | 200.6160 | 0.0812 |
| | Median | 142.7500 | 113.0000 | | |
| Expense Ratio | Mean | 0.0134 | 0.0135 | 0.0001 | 0.8562 |
| | Median | 0.0127 | 0.0127 | | |
| Return | Mean | 0.0083 | 0.0052 | −0.0030 | <0.0001 |
| | Median | 0.0092 | 0.0077 | | |
| Turnover Ratio | Mean | 0.8726 | 0.9282 | 0.0556 | 0.1033 |
| | Median | 0.6525 | 0.6800 | | |
| Monthly Fund Flow | Mean | −0.0008 | −0.0013 | −0.0004 | 0.8472 |
| | Median | −0.0032 | −0.0009 | | |
| Amihud | Mean | 0.0103 | 0.0073 | −0.0031 | 0.0325 |
| | Median | 0.0007 | 0.0005 | | |
| # of Stocks Held | Mean | 125.6295 | 147.7151 | 22.0856 | 0.0302 |
| | Median | 68.0000 | 75.2500 | | |
| Age | Mean | 12.1297 | 10.5613 | −1.5684 | 0.0004 |
| | Median | 9.2500 | 6.6667 | | |

**Table 3:** Characteristics of Mutual Funds Initiating Redemption Fees

This table reports the marginal effects for a probit model of initiating a redemption fee. The sample period spans January 2001 to December 2009. Panel A reports results at a monthly frequency. Panel B reports results at an annual frequency. The dependent variable is 1 in period $t$ if a mutual fund initiated a redemption fee, otherwise it is 0. Funds with a redemption fee initiated prior to period $t$ are excluded from the cross-sectional regressions as are funds with less than 12 months of return data in the period preceding the initiation of the fee. Independent variables are lagged 1-period values and defined in the appendix. Estimates are pooled with fixed time effects. Marginal effects for continuous variables are the average partial effect of a 1 standard deviation change in the associated independent variable value. Marginal effects for discrete variables are the average partial effect of a change from 0 to 1 for all observations in our sample. $^{*}$, $^{**}$, and $^{***}$ denote significance at the 5 percent, 1 percent and 0.1 percent levels respectively.

*Panel A: Monthly Probability of Initiation (unconditional probability of initiation is 0.0038)*

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Standard deviation of cash flow | 0.0004 | 0.0003 | 0.0004 | 0.0002 |
| Adjusted return | 0.0011$^{***}$ | 0.0009$^{**}$ | 0.0014$^{***}$ | 0.0011$^{**}$ |
| Expense Ratio | 0.0002$^{***}$ | 0.0006 | 0.0002$^{***}$ | 0.0005 |
| Turnover Ratio | 0.0002 | 0.0004 | 0.0003 | 0.0005 |
| Log total net assets | 0.0010$^{**}$ | 0.0012$^{*}$ | 0.0009$^{*}$ | 0.0013$^{*}$ |
| Prior initiation in fund family | 0.0045$^{**}$ | 0.0048$^{**}$ | 0.0051$^{**}$ | 0.0054$^{**}$ |
| Small | 0.0021$^{***}$ | 0.0018$^{**}$ | 0.0022$^{***}$ | 0.0018$^{*}$ |
| Amihud | | 0.0007$^{**}$ | | 0.0006$^{*}$ |
| Percent cash | | | 0.0002 | 0.0004 |
| N | 142,987 | 102,575 | 115,533 | 86,999 |
| Pseudo $R^2$ | 0.0923 | 0.0878 | 0.0942 | 0.0909 |

*Panel B: Annual Probability of Initiation (unconditional probability of initiation is 0.0398)*

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Standard deviation of cash flow | 0.0037 | 0.0023 | 0.0025 | 0.0019 |
| Adjusted return | 0.0057$^{**}$ | 0.0041 | 0.0044 | 0.0028 |
| Expense Ratio | 0.0025$^{**}$ | 0.0082 | 0.0025$^{*}$ | 0.0070 |
| Turnover Ratio | −0.0002 | −0.0016 | −0.0006 | −0.0015 |
| Log total net assets | −0.0062 | −0.0063 | −0.0043 | −0.0056 |
| Prior initiation in fund family | 0.0349$^{*}$ | 0.0332$^{*}$ | 0.0382$^{**}$ | 0.0356$^{*}$ |
| Small | 0.0008 | −0.0000 | −0.0009 | −0.0021 |
| Amihud | | 0.0067$^{**}$ | | 0.0048$^{*}$ |
| Percent cash | | | 0.0056$^{**}$ | 0.0065$^{**}$ |
| N | 13,631 | 11,078 | 12,146 | 9,967 |
| Pseudo $R^2$ | 0.0980 | 0.1070 | 0.1180 | 0.1250 |

**Table 4:** Performance Regressions

This table reports predictive regressions of fund performance. The dependent variable in columns 1 through 5 is alpha from the Carhart (1997) four-factor model. The dependent variable in column 6 is quarterly objective category average-adjusted return. The dependent variable in column 7 is annual objective category average-adjusted return. Independent variables are defined in the appendix. Results from Fama-MacBeth (1973) regressions have Newey-West (1987) standard errors with 3 lags and are conveyed in columns 1 and 2. The results from panel regressions have fixed time effects and standard errors clustered at the fund-family level and are conveyed in columns 3 through 7. $^{*}$, $^{**}$, and $^{***}$ denote significance at the 5 percent, 1 percent and 0.1 percent levels respectively.

| | Alpha (1) | Alpha (2) | Alpha (3) | Alpha (4) | Alpha (5) | Obj-adj Return (6) | Obj-adj Return (7) |
|---|---|---|---|---|---|---|---|
| Intercept | 0.0006 | 0.0005 | | | | | |
| | (0.94) | (0.64) | | | | | |
| Expense ratio | $-0.1136^{***}$ | $-0.1142^{***}$ | $-0.0952^{***}$ | $-0.0953^{***}$ | $-0.0779^{***}$ | $-0.2492^{***}$ | $-0.8205^{***}$ |
| | (-4.17) | (-4.21) | (-3.50) | (-3.48) | (-14.07) | (-4.91) | (-9.67) |
| Turnover ratio | $-0.0004$ | $-0.0004$ | $-0.0006^{***}$ | $-0.0006^{***}$ | $-0.0005^{***}$ | $-0.0026^{***}$ | $-0.0102^{***}$ |
| | (-1.46) | (-1.43) | (-4.89) | (-4.88) | (-3.81) | (-5.55) | (-5.20) |
| Log total net assets | $-0.0001$ | $-0.0001$ | $-0.0001$ | $-0.0001$ | $-0.0001^{*}$ | $-0.0003$ | 0.0013 |
| | (-1.35) | (-1.18) | (-1.51) | (-1.75) | (-2.19) | (-1.53) | (1.57) |
| Standard deviation of cash flow | 0.0037 | 0.0031 | $0.0058^{***}$ | $0.0061^{**}$ | 0.0025 | $0.0334^{*}$ | $0.2518^{***}$ |
| | (1.50) | (1.32) | (3.30) | (3.23) | (1.18) | (2.40) | (3.53) |
| Percent cash† | | | | | 0.0000 | | |
| | | | | | (1.56) | | |
| Redemption fee | | $0.0011^{***}$ | $0.0008^{***}$ | | $0.0008^{***}$ | $0.0035^{***}$ | $0.0139^{***}$ |
| | | (3.68) | (4.25) | | (3.67) | (4.82) | (5.28) |
| Follow-on | | | | $0.0011^{**}$ | | | |
| | | | | (2.58) | | | |
| Freq of Obs | Monthly | Monthly | Monthly | Monthly | Monthly | Quarterly | Annual |
| N | 217,574 | 217,574 | 217,574 | 217,574 | 112,523 | 73,645 | 19,719 |
| Adjusted $R^2$ | 0.0333 | 0.0354 | 0.0439 | 0.0438 | 0.0411 | 0.0286 | 0.0484 |

†Percent cash (from Morningstar Direct) is available at higher frequency for some funds, but may be biased if funds with relatively low cash holdings report more frequently. For this reason we do not use this measure in subsequent analysis.

**Table 5:** Changes in Mutual Fund Performance After Redemption Fee Initiation

This table reports the results of an event study on changes to Carhart (1997) four-factor model alphas following the initiation of a redemption fee. Our matching criteria for Panel A are described in the text. Difference-in-difference (DD) estimates of mean event effects are reported. Panel B reports the results around changes to fund management. Panel C reports the results around the removal of a redemption fee. The dependent variable in these last two panels is the residual from the regression of alpha on fixed objective code and time effects, and in the case of additional controls: expense ratio, turnover ratio, log total net assets and standard deviation of cash flow. Pre- and post-initiation ranges denote the start and end months of the event windows. Standard errors are clustered at fund family-level. $^{*}$, $^{**}$, and $^{***}$ denote significance at the 5 percent, 1 percent and 0.1 percent levels respectively.

*Panel A: Redemption Fee Initiation*

| | Initiations (1) | Follow-on Initiations (2) | Initiations (3) | Follow-on Initiations (4) | Initiations (5) | Follow-on Initiations (6) |
|---|---|---|---|---|---|---|
| Pre-initiation Range | (-48, -1) | (-48, -1) | (-36, -1) | (-36, -1) | (-48, -1) | (-48, -1) |
| Post-initiation Range | (0, 48) | (0, 48) | (0, 36) | (0, 36) | (12, 60) | (12, 60) |
| DD Estimate | 0.0004 | 0.0016$^{*}$ | 0.0009$^{*}$ | 0.0018$^{*}$ | 0.0006 | 0.0020$^{*}$ |
| | (1.50) | (2.25) | (2.06) | (2.06) | (1.73) | (2.48) |
| Number of Events | 474 | 92 | 474 | 92 | 474 | 92 |

*Panel B: Changes in Fund Management*

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Pre-initiation Range | (-48, -1) | (-48, -1) | (-36, -1) | (-36, -1) | (-48, -1) | (-48, -1) |
| Post-initiation Range | (0, 48) | (0, 48) | (0, 36) | (0, 36) | (12, 60) | (12, 60) |
| DD Estimate | 0.0013$^{**}$ | 0.0012$^{**}$ | 0.0011$^{*}$ | 0.0010$^{*}$ | 0.0010$^{*}$ | 0.0009$^{*}$ |
| | (2.89) | (2.69) | (2.39) | (2.06) | (2.25) | (2.00) |
| Additional Controls | No | Yes | No | Yes | No | Yes |
| Number of Events | 269 | 269 | 269 | 269 | 269 | 269 |

*Panel B: Redemption Fee Removal*

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Pre-initiation Range | (-48, -1) | (-48, -1) | (-36, -1) | (-36, -1) | (-48, -1) | (-48, -1) |
| Post-initiation Range | (0, 48) | (0, 48) | (0, 36) | (0, 36) | (12, 60) | (12, 60) |
| DD Estimate | −0.0003 | −0.0003 | −0.0002 | −0.0002 | −0.0006 | −0.0006 |
| | (-0.63) | (-0.64) | (-0.44) | (-0.45) | (-1.33) | (-1.44) |
| Additional Controls | No | Yes | No | Yes | No | Yes |
| Number of Events | 301 | 301 | 301 | 301 | 301 | 301 |

**Table 6:** Performance Regressions with Firm-level Fixed Effects

This table reports the results from panel regressions of Carhart (1997) four-factor model alphas on determinants of fund performance. Independent variables are defined in the appendix. Regressions include fund and time fixed effects. Standard errors are clustered at the fund family level. $^{*}$, $^{**}$, and $^{***}$ denote significance at the 5 percent, 1 percent and 0.1 percent levels respectively.

| | Alpha (1) | Alpha (2) | Obj-adj Return (3) | Obj-adj Return (4) | Obj-adj Return (5) | Obj-adj Return (6) |
|---|---|---|---|---|---|---|
| Expense ratio | −0.0532 | −0.0534 | −0.0588 | −0.0583 | −0.1818 | −0.1809 |
| | (-0.96) | (-0.97) | (-0.67) | (-0.66) | (-1.05) | (-1.04) |
| Turnover ratio | −0.0001 | −0.0001 | 0.0012 | 0.0013 | 0.0020 | 0.0021 |
| | (-0.26) | (-0.30) | (1.48) | (1.52) | (0.62) | (0.64) |
| Log total net assets | −0.0025$^{***}$ | −0.0025$^{***}$ | −0.0109$^{***}$ | −0.0109$^{***}$ | −0.0203$^{***}$ | −0.0203$^{***}$ |
| | (-17.44) | (-17.45) | (-17.51) | (-17.52) | (-10.24) | (-10.24) |
| Standard deviation of cash flow | 0.0022 | 0.0022 | 0.0025 | 0.0026 | 0.2704$^{***}$ | 0.2706$^{***}$ |
| | (1.01) | (1.01) | (0.18) | (0.19) | (3.47) | (3.47) |
| Redemption fee | 0.0005 | | −0.0006 | | −0.0014 | |
| | (1.71) | | (-0.41) | | (-0.26) | |
| Follow-on | | 0.0012$^{*}$ | | 0.0083$^{**}$ | | 0.0248$^{*}$ |
| | | (2.19) | | (2.70) | | (2.15) |
| Freq of Obs | Monthly | Monthly | Quarterly | Quarterly | Annual | Annual |
| N | 217,574 | 217,574 | 73,645 | 73,645 | 19,719 | 19,719 |

**Table 7:** Changes in Mutual Fund Characteristics After Redemption Fee Initiation

This table reports the results of an event study on changes to fund specific characteristics following the residual aggregation difference-in-difference estimator of Bertrand, Duflo and Mullainathan (2004). We run panel regressions over the full sample with fixed objective code and time effects to obtain the residuals. We then test for equality of the means of the residuals pre- and post-event. Additional controls, where applicable, are as in Table 8. In Panel A, the event is the initiation of a redemption fee. In Panel B, an event is a follow-on initiation for the first set of columns, a change in fund management for the second set of columns, and the removal of a redemption fee for the third set of columns. The definition of each of these events is available in the text. The dependent variable for each set of results is reported in the leftmost column. Pre- and post-initiation ranges denote the start and end months of the event windows. $^{*}$, $^{**}$, and $^{***}$ denote significance at the 5 percent, 1 percent and 0.1 percent levels respectively.

*Panel A: Redemption Fee Initiation*

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Pre-initiation Range | (-48, -1) | (-48, -1) | (-36, -1) | (-48, -1) |
| Post-initiation Range | (0, 48) | (0, 48) | (0, 36) | (12, 60) |
| Amihud | −0.0029 | −0.0084$^{*}$ | −0.0026 | −0.0037 |
| Percent Cash | −0.7758$^{*}$ | −1.0166$^{***}$ | −0.8167$^{*}$ | −0.7713$^{*}$ |
| Turnover Ratio | −0.0377 | 0.0722 | −0.0337 | −0.0519 |
| Fund Flow | −0.0110$^{***}$ | −0.0052$^{***}$ | −0.0087$^{**}$ | −0.0105$^{***}$ |
| Additional Controls | No | Yes | No | No |
| Number of Events | 474 | 474 | 474 | 474 |

*Panel B: Alternative Events*

| | Follow-on Initiations | | Management Turnover | | Redemption Fee Removal | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Pre-initiation Range | (-48, -1) | (-48, -1) | (-48, -1) | (-48, -1) | (-48, -1) | (-48, -1) |
| Post-initiation Range | (0, 48) | (0, 48) | (0, 48) | (0, 48) | (0, 48) | (0, 48) |
| Amihud | −0.0054 | −0.0043 | −0.0058 | −0.0041 | −0.0087 | −0.0061 |
| Percent Cash | −1.4546$^{*}$ | −1.9179$^{*}$ | 0.1077 | −0.2497 | 0.0698 | 0.4325 |
| Turnover Ratio | −0.0029 | 0.0441 | 0.0044 | 0.0659 | 0.0894 | 0.0707 |
| Fund Flow | 0.0031 | 0.0007 | −0.0015 | −0.0015 | −0.0116$^{**}$ | −0.0051$^{*}$ |
| Additional Controls | No | Yes | No | Yes | No | Yes |
| Number of Events | 92 | 92 | 269 | 269 | 301 | 301 |

**Table 8:** Fund Characteristic Regressions with Firm-level Fixed Effects

This table reports the results from panel regressions of determinants of fund performance on various fund characteristics. Variables are defined in the appendix. Regressions include fund and time fixed effects. Three lags of fund flow are included as additional controls (unreported) for regressions involving fund flow (columns 7 and 8).Standard errors are clustered at the fund family level. The unit of observation for the regressions involving Amihud (columns 1 and 2) and fund flow (columns 7 and 8) are firm-months. The unit of observation for the regressions involving the percentage of cash holdings (columns 3 and 4) and turnover ratio (columns 5 and 6) are firm-years. $^{*}$, $^{**}$, and $^{***}$ denote significance at the 5 percent, 1 percent and 0.1 percent levels respectively.

| | Amihud | | Percent Cash | | Turnover Ratio | | Fund Flow | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Adjusted return | 0.0025 | 0.0025 | 1.1285 | 1.1635 | −0.0933 | −0.0927 | 0.0289$^{***}$ | 0.0287$^{***}$ |
| | (0.92) | (0.93) | (1.69) | (1.74) | (-0.82) | (-0.82) | (9.43) | (9.42) |
| Expense ratio | −0.0473 | −0.0473 | −47.1565 | −45.9702 | 27.1919$^{***}$ | 27.2088$^{***}$ | 0.1077$^{*}$ | 0.1075$^{*}$ |
| | (-0.14) | (-0.14) | (-1.33) | (-1.31) | (4.85) | (4.88) | (2.49) | (2.47) |
| Log total net assets | −0.0031$^{***}$ | −0.0031$^{***}$ | 0.0315 | 0.0403 | −0.0296 | −0.0290 | −0.0046$^{***}$ | −0.0046$^{***}$ |
| | (-5.62) | (-5.61) | (0.35) | (0.45) | (-1.49) | (-1.47) | (-5.06) | (-5.09) |
| Front load | −0.0148 | −0.0141 | 9.6030 | 9.2152 | −2.3540 | −2.2922 | | |
| | (-0.47) | (-0.44) | (1.28) | (1.21) | (-1.26) | (-1.23) | | |
| Turnover ratio | −0.0006 | −0.0006 | 0.0038 | 0.0050 | | | | |
| | (-1.33) | (-1.30) | (0.03) | (0.03) | | | | |
| Size | −0.0435$^{***}$ | −0.0432$^{***}$ | −2.2504 | −1.8612 | −2.6318$^{***}$ | −2.6063$^{***}$ | | |
| | (-3.49) | (-3.46) | (-0.48) | (-0.40) | (-4.49) | (-4.41) | | |
| Age | −0.0014$^{***}$ | −0.0014$^{***}$ | −0.2839$^{***}$ | −0.2858$^{***}$ | −0.0102$^{*}$ | −0.0112$^{*}$ | | |
| | (-6.23) | (-6.36) | (-8.64) | (-8.66) | (-2.18) | (-2.35) | | |
| Standard deviation of returns | 0.0133 | 0.0133 | −20.6857$^{***}$ | −20.2789$^{**}$ | 0.6478 | 0.6312 | | |
| | (0.54) | (0.54) | (-3.33) | (-3.28) | (0.61) | (0.59) | | |
| 12b1 | −0.4808 | −0.4746 | −19.4882 | −19.1076 | −15.0504 | −14.6221 | | |
| | (-1.06) | (-1.04) | (-0.30) | (-0.29) | (-1.25) | (-1.20) | | |
| Redemption Fee | −0.0014 | | −0.5600$^{*}$ | | −0.0749$^{*}$ | | 0.0014 | |
| | (-1.39) | | (-2.32) | | (-2.03) | | (1.17) | |
| Follow-on | | −0.0020 | | −1.7708$^{**}$ | | −0.0790 | | 0.0066$^{**}$ |
| | | (-0.57) | | (-3.11) | | (-1.33) | | (2.80) |
| Freq of Obs | Monthly | Monthly | Annual | Annual | Annual | Annual | Monthly | Monthly |
| N | 134,092 | 134,092 | 10,512 | 10,512 | 11,229 | 11,229 | 220,374 | 220,374 |