The Dynamics of Hedge Fund Fees*

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Abstract

In contrast to the perception of a common 2/20 fee structure, we find considerable cross-sectional and time series variations in hedge fund fees using a large panel data set. New funds in small fund families tend to charge higher incentive fees and lower management fees than those in big families. Such an initial fee structure predicts better performance and a higher survival rate, indicating that this fee structure acts as a signal of good ability. Good performance with a low tracking error leads to a management fee increase, while poor performance leads to fund closure or a management fee decrease. Funds that increase management fee more aggressively experience a bigger drop in subsequent money inflows, and are more likely to maintain their good performance. This suggests fee increases, which typically apply only to new investors, may benefit existing investors by mitigating diseconomies of scale.

KEYWORDS: HEDGE FUNDS, FEE, INCENTIVES.

JEL CLASSIFICATIONS: G23, G29

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1 Introduction

Compensation contracts play an important role in rewarding and disciplining portfolio managers. Theoretical models on optimal contracting highlight the dynamic nature of contractual terms based on the time varying information set available. For example, Heinkel and Stoughton (1994) show that in a multi-period setting, optimal compensation involves recontracting based on past performance of the manager. Such an adjustment of contractual terms is crucial to ensure optimal allocation of capital among managers with differential ability and to ensure optimal provision of incentive over time. The welfare implication of portfolio management contracts is apparent given the large amount of capital invested. At the end of 2009, US registered mutual fund investment companies managed more than $12 trillion assets for nearly 90 million investors. For the hedge fund industry, even after the recent crisis, the assets under management were about $1.34 trillion at the end of 2009 (according to the Lipper Lipper TASS asset flow report).

Despite the importance of dynamic contracting, the empirical literature on portfolio management contracts has mainly focused on static cross sectional relationships. Only recently have researchers started to look at dynamics of contracting.[1] Hedge funds are typically perceived to impose a 2/20 fee structure – 2% management fee and 20% incentive fee. As we discover in this paper, contrary to this conventional wisdom, the management and incentive fees in hedge fund industry exhibit fair amount of cross-sectional and time-series variation. This provides researchers a rich empirical setting to test various theoretical predictions on the dynamics of compensation contracts.

Our dataset consists of all hedge funds covered by the Lipper TASS Hedge Fund Database. The TASS database contains a fee history file that tracks any changes in fund-level management fee and incentive fee during the period from 2001 to 2004. We expand the fee history file by adding four snapshots of hedge fund fees for years 2006, 2007, 2008, and 2009. This allows us to construct a fairly comprehensive record of fund-level fee changes during the period from 2001 to 2009. For all hedge funds appearing in the

[1]For example, see Warner and Wu (2010) and Kuhnen (2005) for changes in mutual fund contracts.

database, we identify instances of fee changes if the recorded management and incentive fees in any given year differ from those recorded in the previous year. We document a total of 659 instances of fee changes during the sample period, including 297 management fee increases. Out of total of 7,613 hedge funds in our sample, 596 funds – roughly 8% – changed fees at least once. We also consider the termination of advisory contract (fund closure) as the extreme case of fee reduction – both the management fee and the incentive fee are reduced to zero upon fund closure.

Based on the snapshots of fee structures over time, we investigate the following research questions:

- What determines the initial choice of hedge fund fee structure?
- What drives the changes in contracted management fee and incentive fee over time?
- What is the impact of fee changes on the subsequent performance, risk, and flow of money?

Our empirical findings provide important insights on several theoretical predictions on the dynamics of compensation contract. In the cross section of almost 3,000 newly established funds, we find that those from smaller families tend to charge lower management fee and higher incentive fees. By contrast, those from bigger fund families tend to charge lower incentive fee in exchange of higher management fee. This is consistent with less established fund families with skilled managers choosing a higher variable component in their compensation structure to signal their superior ability. Furthermore, we find that new funds charging a lower management fee and higher incentive fee tend to have better performance and better chances of survival. The positive relationship between such a fee structure and subsequent success is present only for funds from less established (younger or smaller) families. This provides further evidence for the signaling model of managerial compensation structure.

Over time, our evidence suggests that good peer-adjusted performance with a low tracking error leads to an increase in management fee. This finding is in line with the

idea that investors are willing to raise the fixed compensation on receiving a strong signal of managerial ability. We also find that after poor performance a fund may decrease management fee or close down. Overall, our evidence suggests that hedge fund advisory contracts are adjusted to reflect the updated belief about managerial ability based on past performance.

In hedge funds, an increase in management fees normally applies only to the new investors. We find that a large management fee increase reduces subsequent fund flows dramatically, which presumably mitigates the negative effect of diseconomies of scale. These funds do not experience a significant drop in performance. By contrast, a small increase in management fee fails to reduce fund flows substantially. These funds are unable to maintain their prior superior performance. Furthermore, compared to a control sample matched by the propensity scores, funds with a management fee increase have better subsequent performance, receive lower flows, and take higher risk. Such a fee-flow-performance-risk relationship is consistent with diseconomies of scale in active portfolio management (for example, Berk and Green (2004), Dangl, Wu, and Zechner (2008)).

Finally, we do not find a strong relationship between performance or fund flows and subsequent incentive fee changes. Further, increases in incentive fee are followed by a deterioration of performance. This is inconsistent with the hypothesis that stronger contractual incentives improve managerial performance. Perhaps, in presence of high-water mark and investment of managerial personal capital in the fund, changing contractual percentage of incentive fees is not the best way to align managerial incentives.

Our paper adds to the large literature on compensation contracts and their relation to performance. In the money management industry, the empirical evidence generally suggests that stronger incentive contracts are associated with better performance. Elton, Gruber, and Blake (2003) look at mutual funds and find that funds that charge incentive fees deliver better performance than their peers. In the hedge fund industry, Ackermann, McEnally, and Ravenscraft (1999), Liang (2001), and Edwards and Caglayan (2001) find that hedge funds that charge higher incentive fees have better performance. In a recent

paper, Agarwal, Daniel, and Naik (2009) calculate pay-performance sensitivity of hedge fund compensation contracts. They find that funds with higher sensitivity have higher risk adjusted performance.[2] Cross-sectional positive relationship between explicit incentives and performance is consistent with incentive contracts providing incentives as well as signaling superior ability. We find that there is a positive relation between the high-incentive-low-management fee structure and subsequent performance for new funds from small and young families but not for those from the more established families. This evidence is more favorable to the signaling hypothesis than to the incentivizing hypothesis. Our result that fund performance deteriorates after incentive fee increases casts doubt on the hypothesis that increases in incentive fees provide better incentives that translate into better performance.

Recent work by Ramadorai and Streatfield (2011) looks at initial fee structure of newly incepted hedge funds. Similar to our result that larger fund families charge higher management fee, they also find that larger and better performing fund families start high fee funds. They also find that average initial fee changes over time. We examine the hedge fund fees from a dynamic perspective. In addition to the initial fee structure, we also look at changes in the fees charged by a fund and implications of those changes.

Our paper also contributes to the studies that investigate causes of changes in the management contracts. Kuhnen (2005) examines the dynamics of contractual agreements between mutual funds and investment advisors. Christoffersen (2001) documents that mutual funds voluntarily waive fees following poor performance. Liang (2001) finds that poor performance results in a reduction in incentive fee for hedge funds. We also find that changes in contracts are related to prior performance. However, we find that management fees are more sensitive to prior performance than incentive fees, and that they are adjusted in both directions.

Another related paper is by Warner and Wu (2010). They look at changes in mutual fund advisory contracts. Similar to us, they also find fees increase after good performance.

[2]An exception to this positive relationship is Brown, Goetzmann, and Ibbotson (1999) who examine off-shore hedge funds and do not find evidence that funds with higher fees deliver better performance.

However, in their case, fees decrease not after poor performance but after growth from money inflows. By contrast, we find that money inflows increase the probability of management fee increase, indicating that in the hedge fund industry, diseconomies of scale are more likely to be the norm than economies of scale. Furthermore, given the high attrition rate of hedge funds relative to mutual funds, we explicitly consider fund closures as an alternative to a fee decrease, and find that fund closures are even more strongly related to poor past performance and money outflow than are fee decreases. This result highlights the fundamental role of contract termination as an element of dynamic contracting, as emphasized by Heinkel and Stoughton (1994), in the hedge fund industry.

Golec and Starks (2004) look at the impact of changes in fee structure of mutual funds from asymmetric to symmetric performance fee in response to a change in regulation. They find that changes in risk-taking by fund managers are related to changes in the fee structure. Also, their results show that exogenously mandated changes in the fee structure negatively affect fund flows. We study how hedge fund fees are endogenously chosen initially and changed over time, as well as the implications of such fee changes on performance, fund flows and risk in an equilibrium with capital mobility and diseconomies of scale.

The rest of the paper is organized as follows. In the next section, we develop hypotheses based on different theoretical models. Section 3 describes our data. In Section 4 we explore the determinants of initial fees, and subsequent survival and performance of new hedge funds. Section 5 presents analysis of what leads to changes in management and incentive fees. A comparative examination of difference in performance, risk-taking and fund flow around fee changes is conducted in Section 6. The last section concludes.

2 Hypotheses

In this section, we build on intuition of different theoretical models to develop relevant hypotheses for empirical investigation. This helps us organize our tests and interpret our

findings.

2.1 Initial fee structure

We first investigate how initial fees are determined for a newly introduced fund. Existing theories provide conflicting predictions on this issue. Models that focus on the signaling function of the fee structure suggest that funds in less established families are more likely to charge lower management fees and higher incentive fees, while models that emphasize learning and implicit incentives predict the opposite. Gompers and Lerner (1999) present two alternative models to illustrate these competing ideas. Their model is designed to illustrate compensation contracts of venture capitalists, but it can also be applied in a hedge fund setting.

In the presence of asymmetric information about managerial skills, fund managers can optimally choose compensation contracts to signal their true ability. In the signaling model of Gompers and Lerner (1999), managers with privately known superior ability separate themselves from managers with poorer skills by accepting more risk in their compensation, i.e., charging low management fees and high incentive fees. After the ability is revealed, managers with higher skills prefer to capture their rents by charging higher management fees instead of incentive fees because they are risk averse. According to this theory, less established hedge fund companies, presumably smaller and younger ones, are more likely to charge lower management fees and higher incentive fees.[3] A further implication of this theory is that, among the new funds from less established companies, those charging high incentive and low management fees should have better future performance, since such a fee structure is endogenously chosen by managers with superior skills.

By contrast, models focused on implicit incentives and symmetric learning about managerial ability predict smaller and younger firms charge lower incentive fees. Since less

[3]Consistent with this prediction, the first hedge fund in the world, set up by Alfred Winslow Jones in 1949, charged 20% incentive fee but no management fee, according to Caldwell (1995).

established managers have to build up their reputations in order to keep the existing clients and attract new investors, they work hard even in the absence of explicit incentive fees. For companies that are already well-established, such implicit incentives are weaker. Therefore, higher explicit incentive fees are needed to induce effort. This feature of optimal contracts has been highlighted in the learning model of Gompers and Lerner (1999), as well as the dynamic contracting model of Gibbons and Murphy (1992), Heinkel and Stoughton (1994).

We state these two competing hypotheses about the initial fee structure as follows:

- **H1A (Signaling hypothesis)**: *Younger, smaller and thus less established hedge fund families are more likely to charge lower management fees and higher incentive fees. Furthermore, such a fee structure is associated with better future performance.*
- **H1B (Implicit incentive hypothesis)** *Younger, smaller and thus less established hedge fund families are more likely to charge lower explicit incentive fees.*

2.2 Determinants of fee changes

While the initial fee structure may reveal some information about managerial ability, such revelation is most likely incomplete.[4] Furthermore, managerial ability may change over time, and managers themselves may not have complete information about their own abilities. Under such circumstances, realized performance can serve as a useful signal. When a manager performs well and the belief about her ability moves upward, the competition among investors for managerial skill then allows her to negotiate a higher management fee. Conversely, poor performance leads to a fee reduction (see for example, Holmstrm (1999), Gibbons and Murphy (1992), and Gompers and Lerner (1999)). Poor performance may also lead to the termination of the portfolio management contract (Heinkel and Stoughton

[4]For example, in a two-period model, Heinkel and Stoughton (1994) show that it is in the interest of investors to induce a semi-separating equilibrium in the first period rather than a pure separating equilibrium that fully reveals the type of managers, because managers work harder when they have to demonstrate their ability by performance.

(1994)), in which case a fund is shut down.

According to the Bayesian learning rule, the sensitivity of the belief about managerial ability to fund performance is stronger if the performance is less noisy, i.e., it is subject to less influence by shocks outside the manager's control. If the performance is very volatile and largely driven by external shocks, then little can be learned from past performance.

In light of these theories, we formulate the following hypothesis:

- **Hypothesis 2**: *Superior performance leads to an increase in management fee, while poor performance leads to a decrease in management fee or fund closure. These effects are stronger when the volatility of performance is low.*

Clearly, fee increase is not the only way for a fund managers with good performance to capitalize on their perceived high ability. Due to the positive relation between new money flows into a fund and its past performance, an outperforming manager can simply leave the fees unchanged and get rewarded by the growth of his fund.[5] Berk and Green (2004) and Dangl, Wu, and Zechner (2008) show that managers are indifferent between these two alternative strategies if they can alter the portfolio risk freely. To the extent that hedge fund managers may have limited freedom in altering the portfolio risk due to their commitment to certain investment styles, adjusting management fees would be optimal when changes in the belief about their ability is beyond a certain threshold.

The relation between past performance and the change of incentive fees is less straightforward. In a standard principal-agent model with risk-neutral investors and a risk-averse manager, if the marginal productivity and effort costs are the same for high- and low-ability managers, as in Gibbons and Murphy (1992) and Gompers and Lerner (1999), the optimal variable compensation is independent of the managerial skill revealed through performance. Only the fixed compensation is adjusted to reflect the updated belief. Therefore, one would expect incentive fees to be unresponsive to past performance. How-

[5]Baquero and Verbeek (2009) and Ding, Getmansky, Liang, and Wermers (2009) find a strong positive relation between a hedge fund's past performance and the money flows it receives.

ever, if the marginal productivity of effort is higher for more skilled managers, optimal pay-performance sensitivity may increase with the updated belief about managerial ability. In this case, we would expect an increase in incentive fees after good performance. Furthermore, it may also be the case that underperforming funds increase incentive fees in order to induce more effort, since the underperformance may be due to insufficient pay-performance sensitivity. For example, in the CEO compensation literature, Gilson and Vetsuypens (1993) document a significant increase in stock-option compensation for companies in financial distress. We are agnostic about these competing predictions and rely on the data to determine which scenario is applicable in our context.

2.3 Implications of fee changes

The model of Berk and Green (2004) provides a good starting point for analyzing the implications of management fee changes on fund performance and fund flows. Within this framework, the management fees charged by the portfolio manager have an impact on fund flows, but not on expected net returns. When the management fees are fixed, an outperforming fund tends to attract new money flows, which in turn drive down future fund performance due to decreasing returns to scale. If outperforming funds increase management fees, new money inflows will be reduced, funds may thus be able to maintain their good performance on a before-fee basis, but the expected net return will decline due to higher fees.

In the hedge fund world, when a well-performing fund increases its management fee, the newly increased fee is typically applied to new investors but not the existing clients. This particular feature of hedge fund fee setting implies a more subtle effect of management fee increase on fund performance. In this case, the fee increase does not reduce the net return to the existing investors. At the same time, it reduces the performance chasing new money flows, thus mitigating the negative impact of decreasing returns to scales. As a result, we arrive at a novel prediction that management fee increase helps a fund maintain its superior performance.

- **Hypothesis 3**: *Increases in management fees mitigate the negative impact of new money flows on fund performance. As a result, superior performance of funds with a large management fee increase is more likely to persist.*

Theories on manager's risk-taking behavior provide some guidance about the potential impact of fee changes on fund risk. Since the incentive fees of hedge funds are asymmetric, i.e., managers benefit from the upside potential but do not bear the downside risk, managers tend to have an incentive to take more risk. An increase in incentive fees may make this tendency stronger and thus lead to an increase in fund risk. In an environment with diseconomy of scale, higher management fee is also likely to be associated with higher fund risk. For example, in the model of Dangl, Wu, and Zechner (2008), for any given level of managerial ability, fund risk increases linearly with the proportional fee charged by the manager. This is because higher fees reduce fund size, thus allowing the manager to take more aggressive positions in illiquid markets without much concern of the negative price impact of trades. In light of these theories, we state the following as our fourth hypothesis.

- **Hypothesis 4:** *Both management and incentive fee increases (decreases) are followed by an increase (decrease) in fund risk.*

The impact of incentive fee changes on fund flows and performance is more difficult to predict. To the extent that an adjustment of incentive fee represents an attempt to optimize the pay-for-performance sensitivity based on an updated information set, it should have a positive impact on fund performance by better aligning managerial incentives. This positive effect should then induce more money inflows. However, incentive fee increase may also be a step taken by the fund manager to extract more surplus from investors, in which case it will have a negative impact on expected fund return, and thus leading to a decrease in money inflows.

Looking at determinants of initial fees and fee changes as well as consequences of fee changes will allow us to get a comprehensive view of dynamics of hedge fund advisory

contracts. We now go on to describe the data we use to test our hypotheses.

3 Data

Our sample consists of all hedge funds covered by the Lipper TASS Hedge Fund database (TASS) from 2001 to 2009. The database tracks monthly net asset value (NAV), fund returns, and total net assets (TNA) for over 7,000 live funds and over 6,000 "graveyard" funds.[6] It also provides comprehensive information on fund inception date, start and end dates for reported performance, investment objectives, names of portfolio managers and management firms. Moreover, it gives snapshots of fund characteristics including management and incentive fees, high-water mark, minimum investment requirement, lockup periods, redemption notice periods, maximum and average leverage ratio, etc.

Most relevant to our study, the TASS database contains a fee history file that tracks any changes in fund-level management fee and incentive fee during the period from 2001 to 2004. We expand the fee history file by adding four snapshots of hedge fund fees in August 2006, October 2007, and December 2008 and 2009. This allows us to construct a fairly comprehensive record of fund-level fee changes during the period from 2001 to 2009. For all hedge funds appearing in the database, we identify instances where recorded management and incentive fees in any given year differ from those recorded in the previous year. In our empirical analysis, we restrict to U.S. dollar denominated funds that report contractual fees. The final sample consists of 7,613 hedge funds.

Admittedly, the fees that hedge funds reported to the TASS database may not capture exactly the actual fees paid by all fund investors. Depending on their relations with the fund manager, and the amount of money they commit, some investors may be able to negotiate a fee lower than the reported one. However, such noise in the data will bias against finding any significant results.

[6]Graveyard funds are funds that have closed, liquidated, or stopped reporting for any reason.

3.1 Summary Statistics

Table 1 presents summary statistics for roughly 23,000 fund/year observations in our sample. The mean management fee and incentive fee are 1.44% and 15.98%, respectively. In contrast to the common perception that hedge funds all have the same fee structure, both management fee and incentive fee exhibit considerable dispersion. The standard deviation of management fee is 0.61%, while the standard deviation of incentive fee is 7.27%. Nearly 60% of the fund/years show use of leverage. About 68% of fund/year observations have high-water mark provision, while 32% involve personal capital investment by fund managers.The average minimum capital requirement is 1.2 million dollars, and the average lockup period is about 4 months. The average fund age and fund family age are 72 and 105 months, respectively.

Table 2 shows the pattern of fee changes over time and by hedge fund investment style. Out of total 659 fee changes that we identify, vast majority (575) are instances where only one fee (either management fee or incentive fee) changed. Out of these, instances of management fee increase dominates with nearly 300 cases. In Panel A, about 30% (98 out of 297 instances) of management fee increases occurred in 2006. In 2008 and 2009, the number of management fee increases dropped to 54 and 24, respectively. This could be due to the large deterioration in hedge fund performance during and immediately after the financial crisis, making it difficult to justify any increase in management fees. We observe nearly 45% of management fee decreases (63 out of 139) during 2008-2009. It is possible that, in addition to cutting fees, many poorly performing hedge funds simply shut down.

When we look at fee changes by style in Panel B, we see that fund of funds and long/short equity dominate fee change events. We take into account style specific nature of fee changes in our analysis.

Table 3 shows the level of fees prior to changes and the magnitude of changes. A clear pattern emerges that fees prior to an increase are on average much lower than fees prior to

a decrease. In Panels A and B, the average management fee prior to an increase (decrease) is 1.04% (1.73%) compared to the overall average of 1.44% from Table 1. Similarly, from Panels C and D, the average incentive fee prior to an increase (decrease) is 8.7% (18.26%) compared to the overall average of 15.98%. In terms of the magnitude of fee changes, the average increase (decrease) in management fee is 0.69 (0.65) percentage points, and the average increase (decrease) in incentive fee is 10.73 (8.78) percentage points. The magnitude of these changes is economically large given the average level of fees before a change.

3.2 Variable Definitions

We measure the performance of hedge funds using the style-adjusted return. We first compute benchmark returns for each style by taking the asset weighted average of monthly fund returns based on the 12 primary strategy categories identified in the TASS database. Then for each fund we calculate the style-adjusted return as the excess return relative to the benchmark return for its style. We also examine the effect of volatility, measured as the standard deviation of style-adjusted returns. We compute these measures using monthly data over either a three-year or one-year period.

We also use alpha based on a 7-factor model, as suggested in Fung and Hsieh (2001) and Fung and Hsieh (2004), to measure hedge fund performance. We use monthly data over a three-year period to estimate the alpha. The factors comprise of return on the Standard & Poor's 500 index (equity market factor), return on the Russell 2000 index return less the Standard & Poor's 500 return (equity size-spread factor), monthly change in the 10-year treasury constant maturity yield (bond factor), monthly change in the Moody's Baa yield less the 10-year treasury constant maturity yield (credit spread factor), and returns on the trend-following risk-factors on bonds, currencies, and commodities.[7] For 3-year analysis, the results using 7-factor alpha are qualitatively similar to those obtained using

[7]The monthly returns for the trend-following factors are downloaded from David Hsieh's website: http://faculty.fuqua.duke.edu/ dah7/DataLibrary/TF-Fac.xls.

style adjusted returns. For brevity, we report in this paper only results based on style adjusted performance.

To account for the impact of new money flows on fund fee changes, we include in the regression the average monthly new money growth. The monthly new money growth is calculated as follows.

$$\text{Fund Flow}_{it} = \frac{TNA_{it} - TNA_{it-1}(1 + R_{it})}{TNA_{it-1}},$$

where TNA_{it} and R_{it} respectively represent the total net assets and the net-of-fee return for fund i at the end of month t.

4 Determinants of Initial Hedge Fund Fees

In this section, we investigate the determinants of initial hedge fund fees. The sample here consists of first observed snapshots of 2,872 new hedge funds with age less than two years. We observe that, although a large mass of hedge funds charge fees at the median of their investment style, there is considerable cross-sectional variation. For management fees, 952 (33%) of funds set their fees at exactly the style median. We observe 1,041 (36%) funds setting their fees below the style median. The remaining 879 (31%) funds set their fees above the style median. Incentive fees exhibit a lot more concentration (about 75% of funds) at the style median. For the remaining funds, 531 (18%) charge incentive fees below the style median while 213 (7%) funds set their fees above the style median. We define a rank variable for each fee to capture high, at-median and low fee relative to the respective style median. We estimate cross-sectional ordered probit regressions separately for management fee and incentive fee to examine which funds start out with high fees.

We examine the complementary or substitution effect between the two types of fees by including indicator variables for high and low initial incentive fee in the management fee regression and vice-versa. Both regressions also include a common set of explanatory

variables consisting of high-water mark provision, an indicator variable that equals one if the fund takes on leverage, the logarithm of minimum investment requirement, the logarithm of lockup period, and an indicator variable set to one when fund managers invest personal capital in the fund. We emphasize here that all the variables are part of hedge fund contracts and hence co-determined with the level of fees. We have included them in the regression to analyze complementarity across contract terms rather than to claim causality. We also include two indicator variables – Young Family and Small Family – to capture fund families whose age or TNA is below the average of all fund families during that year.

The regression results are presented in Table 4. Small fund families tend to charge a significantly lower management fee, although the effect of young fund family dummy on management fees is not significant. On the other hand, funds from young families as well as small families charge a significantly higher initial incentive fee. Hence, less established hedge fund families tend to charge higher incentive fees and lower management fees. This result is consistent with less-established families using such a fee structure to signal their quality, thus lending support to the signaling hypothesis (Hypothesis 1A). It contradicts the implicit incentive hypothesis (Hypothesis 1B).

We find strong complementary effect between the initial management fee and the initial incentive fee. Other control variables have intuitive effect on the initial level of fees. The high-water mark provision is negatively related to the initial management fee, but positively related to the initial incentive fee. Both coefficient estimates are statistically significant at the 1% level in three out of four cases. This is intuitive since investors would want a high-water mark provision to discourage managers from taking too much risk which might be induced by high incentive fees. We also find that the use of leverage has a positive and significant relationship with both management and incentive fees. Finally, we find a positive and significant relationship between the personal capital investment by fund managers and the initial incentive fee. For funds with high incentive fees, personal capital commitment by fund managers could provide a strong signal that managers will not make

opportunistic investments and thus better align the interests between investors and fund managers.

To further investigate the role of initial fee structure in signaling managerial skill, we test whether higher level of incentive fees combined with lower level of management fees predict better future fund survival and performance, and particularly whether the relation differs between funds from younger or smaller families and funds from older or larger families. The idea is that the signaling effect of such a fee structure should be particularly strong for young and small families without an established track record. We use the sample that includes all young hedge funds (with age less than 2 years) that first appeared in TASS on or before 2007. We examine performance, defined as the average monthly style-adjusted return during the three-year period following the first snapshot, if the fund survives. A fund does not survive (Survival=0) if it drops out of the TASS database within 2 years after the initial appearance due to reasons other than merger or being closed to new investors. Otherwise, the fund survives (Survival=1). We investigate subsequent fund survival as well as performance as a function of initial fee setting, young family and small family indicator variables, their interaction with initial fees, and some key fund characteristics. For the fund performance regression, we control for the survivalship bias using the procedure suggested in Heckman (1979). We also control for year and style fixed effects in the fund survival regression, since it is possible that the chance of survival is affected by when a fund with particular investment style is introduced/marketed to the investors. To capture the signaling fee structure, we use Low-Mgt-High-Inc, an indicator variable equal to 1 when the management fee is below its style median and the incentive fee is above its style median.

Table 5 presents the estimation results. Low-Mgt-High-Inc by itself does not have a significant effect on fund survival. However, when such a fee structure is charged by a fund coming from a young or a small family, it has a significant positive effect on fund survival. To see if this positive effect completely offsets lower survival rates observed for young or small families we compare the survival probability of funds from small or

young families charging high incentive fee and low management fee with that of funds from larger or older families without such a fee structure by conducting an F-test. The first of joint tests at the end of Table 5 captures the survival of signaling funds from small or young families relative to non-signaling funds from big or old families. This effect is always positive and sometimes significant. Thus, on the whole funds coming from young or small families are more likely to close down within two years of their appearance. But, based on the F-test, funds from small or young families with the signaling fee structure are at least as good or better at surviving compared to non-signaling funds from larger or older families. Further, with the second joint test, we compare small/young family funds that signal with other funds from such families. These signaling funds have a significantly higher probability of survival than that of their peers from similar families.

The performance regressions in Table 5 examine the effect of initial fee structure on performance, after controlling for fund survival. The results are similar to those about fund survival. Again we conduct joint F-tests to compare the performance of signaling funds with that of non-signaling funds. These tests suggest that the signaling funds from small families significantly outperform non-signaling funds from large families by 37 basis points per month and non-signaling funds from small families by 39 basis points per month – both effects being statistically significant at the 5% level. The evidence for funds from young families is similar. These results taken together with the survival results indicate that the initial fee structure is indeed a signal about managerial ability.

Note that our analysis on the initial fee structure is not subject to any back-filling bias.[8] The snapshots of hedge fund fees are available only after a fund starts reporting to the TASS database. Since in Table 5 we focus on fund performance and survival during the three-year period following the first snapshot, the analysis automatically excludes any back-filled returns. We also conducted the analysis using 7-factor alpha as a measure of performance. The results are similar to those presented in Table 5.[9]

[8]Since reporting by hedge funds to TASS is voluntary, those funds that choose to report their performance, usually back-fill their return history. There may be a concern that these back-filled returns are biased upwards since the managers with good histories are more likely to start reporting to the databases.

[9]These and other results of robustness checks not presented in the paper are available from the authors

To summarize, we document that funds from smaller and younger fund families charge higher incentive fees. Funds from smaller families also tend to charge lower management fees. Furthermore, funds from younger or smaller families with high incentive fees and low management fees are more likely to survive and deliver better performance. These results provide support for the signaling hypothesis. Smaller and younger families do not have established reputations. New funds from these families and confident about their managerial ability would be in greater need for signaling. Such funds are more likely to choose the high incentive and low management fee structure, and subsequently deliver better performance.

5 Causes of Hedge Fund Fee Changes

In this section, we examine the determinants of hedge fund fee changes and hedge fund closures using a multinomial logistic regression. We separately present results on instances of management fee changes and incentive fee changes. The base case outcome is fee unchanged. The alternative outcomes include fee increase, fee decrease, and fund closure. A fund closure occurs if a fund drops out of the TASS live fund database due to reasons other than merger or being closed to new investors before the next snapshot. The explanatory variables include the level of management and incentive fees (relative to the respective style medians) prior to the fee changes, prior average and standard deviation of monthly fund performance adjusted for style mean, the interaction between the style-adjusted performance and an indicator for standard deviation (high std. dev.), and prior average monthly fund flow. We measure fund performance, tracking error, and fund flow over previous three-year and one-year periods. All variables are defined in Section 3.2. We also include a set of fund and fund family characteristics similar to those used in the initial fee regressions presented in the previous section.

Table 6 presents the results of a multinomial logistic regression that models the prob-

upon request.

ability of management fee increase, decrease and fund closures. The results are similar for three-year and one-year regressions. We find that superior past fund performance strongly predicts management fee increases. One percentage point higher average monthly risk-adjusted return during the previous year improves the odds of an increase in management fee by nearly 40%.[10] Interestingly, the coefficient estimate for the interaction term between past performance and indicator for high standard deviation is negative and statistically significant at the 1% level. Moreover, the magnitude of negative coefficient for the interaction term offsets most of the positive effect of the performance. This suggests that only funds that deliver better style-adjusted performance with a low volatility are more likely to increase management fees. This is consistent with the optimal learning of managerial ability from past performance. If the better performance has a low volatility, then investors can be more certain that it reflects managerial ability, and therefore it will be easier for the fund manager to increase the fee. On the other hand, if the performance is volatile, then any superior performance is more likely due to luck rather than ability. Such performance therefore has less impact on the contractual terms.

We find that poor performance predicts a fee decrease as well as fund closure. One percentage point lower average monthly risk-adjusted return during the previous year increases the odds of fund closure by nearly 40% and increases the odds of a decrease in management fee by around 30%. Poorly performing funds could choose closure instead of a decrease in management fee. Again, we find that high standard deviation partly negates the effect of performance on fund closure. It appears that investors forgive an occasional poor outcome, attributing it to bad luck. Further, not surprisingly, outflow of money from the fund is strongly associated with fund closure.

Table 6 also finds that initial level of management fees is significantly related to the subsequent changes. Specifically, funds with high (low) prior level of management fees are more likely to decrease (increase) management fee in the subsequent year. Thus some funds may start out with lower management fee, deliver superior performance and then

[10]Proportional change in odds ratio is calculated as $exp(0.334)-1$, 0.334 being the coefficient of one-year performance for management fee increase from Table 6.

increase the fee.

Table 7 shows the results of a similar multinomial logistic regression that models the probability of incentive fee increase, decrease and fund closures. The results for fund closure here are similar to those in Table 6. Consistently poor performance predicts fund closure and not a fee decrease. Again, prior level of incentive fee is strongly associated with subsequent changes. Funds with higher (lower) incentive fees are more likely to decrease (increase) them. We find no significant impact of past performance and fund flows on incentive fee changes.

Since funds tend to close down in response to poor performance rather than decrease fees, we observe fee decreases only for survivors. Funds that survive after poor performance are likely to have more entrenched managers, and are therefore less likely to reduce their fees. This leads to a sample selection bias. What happens when we account for this bias? We conduct the analysis for fee decreases with Heckman correction which accounts for the survivorship bias. The first stage probit regression models the fund survival while the second stage probit regression models the probability of fee decrease. Survival is 0 if the fund drops out of the TASS live fund database due to reasons other than merger or being closed to new investors. Otherwise, survival is 1. Based on Tables 6 and 6, control variables such as fund and family age and TNA and other contractual terms have significant effect only on fund closure and not on fee decrease. Thus, we include these variables only in the survival regression. Table 8 presents the results for management fee decrease. The results for the relationship between poor performance and management fee decrease are statistically slightly more significant. As can be seen from Table 9, even after we account for the sample selection bias, we do not find any effect of prior performance on a decrease in incentive fee. However, now lower fund flow predicts a decrease in incentive fee.

To examine the effect of any potential bias due to back-filled returns, we conduct the logistic analysis for fee changes using performance after excluding fund returns in or before the year when the fund was added to the TASS database. These results are similar

to those discussed above, although in some cases statistically weaker. We also repeat the analysis with 7-factor alpha as a measure of performance. The results are qualitatively similar to those presented in Tables 6 to 9.

Overall our results about management fee changes supports the idea that performance acts as a noisy signal for managerial ability. Consistent with Hypothesis 2, investors respond to a consistently good performance as a strong signal of superior ability and reward the hedge funds with a higher management fee. Good performance but with high standard deviation may be perceived more as luck and does not result in increased compensation.

6 Performance, Risk and Fund Flow after Fee Changes

In this section, we investigate the changes in fund performance, risk taking, and fund flow following the fee alterations. Specifically, we examine the style-adjusted return, fund flow, and the standard deviation of style-adjusted returns, all measured over one-year period using monthly observations. There are too few observations for us to examine the three-year period subsequent to the fee changes. We regress each of these variable on indicator variables Before and After to capture a particular fee change event. These variables are zero for the group of control funds that do not change fees throughout the sample period. We interact the After indicator variable with the magnitude of fee change to capture differential effect following small versus large fee changes. The control variables include the prior level of fees (relative to respective style medians), fund and family size, fund and family age, and other fund characteristics lagged by one year. The standard errors are clustered at the fund level.

Table 10 reports results around management fee increase. In Panel B, we present results of F-tests on the null hypothesis that, there is no change in performance, flows, or volatility following different levels of management fee increase. We find that, consistent with previous results, performance is significantly better before the fee increase. Follow-

ing the fee increase, the style-adjusted return exhibits a significant decline of 17 basis points per month (over 2 percentage points per annum). Further analysis reveals that the magnitude of performance drop depends on the level of fee increases. For a small increase of management fee by 25 basis points (roughly the 25th percentile), the risk-adjusted performance declines by 31 basis points per month. For a moderate increase in management fee by 50 basis points (median change), the drop in performance is smaller – 23 basis points per month. In both cases, the performance deterioration is statistically significant at the 1% level. Interestingly, for a large fee increase of 100 basis points (roughly the 75th percentile), the performance drop is only an insignificant 7 basis point per month – suggesting that these funds continue to outperform the control group following the large fee increase.

Opposite is the case for fund flow. Following the management fee increase, the overall fund flow declines by about 1.14 percentage point per month (13.7 percentage points per annum) – statistically significant at the 1% level. We again find that the negative impact on fund flow critically depends on the level of fee change. For a small fee increase of 25 basis points, we find no significant decline in subsequent fund low. For a moderate fee increase of 50 basis points, fund flow declines significantly by nearly 87 basis points per month. Most strikingly, for a large fee increase of 100 basis points, we observe a huge drop in fund flow of more than 1.6 percentage points per month.

The above findings are closely related to theoretical predictions related to the fee-performance-flow relationships in Berk and Green (2004) and Dangl, Wu, and Zechner (2008), and lend support to our Hypothesis 3. In the previous section, we document that management fee is likely to increase following a period of persistently good performance. In absence of any fee increase, such a superior performance will be followed by inflows into the fund. A small increase in management fee does not significantly discourage these performance-chasing fund inflows. Larger fund size resulting from higher fund flow combined with decreasing returns to scale, could account for the significant drop in performance followed by a small increase in management fee. By contrast, large manage-

ment fee increases lead to a dramatic drop in fund flow, thus mitigating the negative effect of diseconomies of scale. Since the increase in management fee normally applies only to new investors, the good after-fee performance is sustained following a large increase in management fee.

Table 10 also shows that the change of fund risk after management fee increases is insignificant for the whole sample, but it increases with the magnitude of the fee increase. For the funds with a 1% or above increase in management fees, there is a marginally significant increase of 27.4 basis points in monthly volatility. This lends some weak support for our Hypothesis 4. The slight and insignificant drop in the volatilty for the small fee increase group can also be explained by the model of Dangl, Wu, and Zechner (2008). They shows that in the absence of fee changes, funds tend to take less idiosyncratic risk after good performance, because the subsequent growth in fund size makes it more difficult to take aggressive positions in illiquid markets. A small increase in management fee, which tends to ocurr after good performance, weakens this tendency, but not necessarily reverses it. Thus we see a slight drop in volatility.

Since the management fee changes are not random, as we see from Section 5, the panel regression results above reflect both the endogenous relation between fee increases and past fund characteristics, and the causal effects of fee increases. To better understand the impact of management fee increases on returns, flow and risk, we conduct an analysis using the propensity score matching approach. This approach has been widely used to examine causal treatment effects in medical study. To implement this approach, we first create for our management fee increase funds (treatment group) a control group using a logit model. The logit model use all the explanatory variables in Table 6 (performance, standard deviation, interaction of the two, and fund flow along with other control variables) to predict the management fee increase event. The control group is constructed using the nearest neighbor matching method; that is, for each management fee increase fund, we select as its control the fund that has closest predicted probability but does not actually increase its fee. We then examine the differences in the style-adjusted return,

fund flow, and risk between these two groups in the subsequent 12-month period. Under the assumption that conditional on the observed fund characteristics, management fee increases occur at random, one can interpret the differences between these two groups as the causal effects of the management fee increases.

Results based on propensity score matching are presented in Table 11. These results provide further support for our Hypotheses 3. Funds that increase management fee outperform the control funds by 23 basis points per month, a marginally signficant effect. They also experience lower flows, by 63 basis points per month, an economically large effect even if statisically insignificant. Furthermore, both effects get stronger as the magnitude of fee increase gets bigger. For funds that increased management fee by 0.50% or more, outpeformance is 28 basis points per month and significant at 5%. The effect is strongest for most aggressive fee increases of 1% or more – outperformance of 54 basis points per month and flows lower by 1.12 percentage point per month.

Table 11 also lends direct support to our conjecture about the impact of management fee increases on fund risk (Hypothesis 4). The volatility of the treatment funds is significantly higher than that of the control group, and the difference increases monotonically as the fee hike becomes larger. For the group of funds with 1% or above fee increase, the difference in monthly volatility is 1.58 percentage point, with a t-statistics of 3.80. These results suggest higher management fee are indeed associated with more aggressive risk-taking, as predicted by the model of Dangl, Wu, and Zechner (2008).

Table 12 examines performance, flow and volatility around an increase in incentive fee. From Panel A, we see that before the incentive fee increase, funds on average outperform its control group by around 20 basis points per month, and receive about 61 basis points more fund flow than the control group. Following the fee increase, we see that the outperformance and higher fund flow completely disappear, even turning slightly negative. This result, particularly the lack of new money flow following incentive fee increase, casts doubt on the hypothesis that an increase in the contractual incentive fee improves performance. If that were the case, we should see the fund attract new investors. Holding everything

else the same, an increase in incentive fee increases the sensitivity of manager's pay to fund performance. However, the incremental effect may be small, given the presence of high-water mark, and other terms in the hedge fund advisory contracts. Thus, an increase in incentive fee may not necessarily improve incentives sufficiently to offset the negative impact of higher fees on net performance.

The table also shows the volatility of fund returns does not change significantly after the increase of incentive fee, a result that does not provide support for Hypothesis 4 with regard to incentive fee increase.

Following a decrease in either type of fee, we do not find significant changes in performance, fund flow or risk-taking.[11] This could be because rather than decreasing fees, many funds in trouble may choose to close down as indicated by the results in Tables 6 and 7.

To address any potential bias resulting from back-filled returns, we conduct the analysis of performance before and after the fee changes after excluding fund returns in or before the year when the fund was added to the TASS database. These results are similar to those discussed above.

To summarize, a key finding in this section is that an increase in management fee, large enough to reduce future fund flows substantially, mitigates the negative impact of diseconomies of scale on fund performance. This result suggests that the management fee increase after good performance is actually beneficial to the existing fund investors, who usually do not have to pay the increased fee. It pretects them from the competition for the managerial ability by the new investors.

[11]These results are not reported but are available from the authors upon request.

7 Conclusion

In this paper we examine variation in initial management and incentive fees charged by hedge funds. We also investigate causes and impacts of contractual changes in these fees. We find that younger, smaller and thus possibly less established fund families charge higher incentive fees. Smaller families also charge lower management fees. This is consistent with fund families with no track record but good managers signaling the superior skill by charging lower management fee and higher incentive fee. This superior skill should be reflected in better performance subsequently. Indeed, we find that new hedge funds from younger and smaller families with such a fee structure are more likely to survive subsequent two years and deliver better performance.

Further, a superior style-adjusted prior performance leads to an increase in management fee, but only if the volatility of the relative performance is low. After consistently poor performance, hedge funds tend to close down or decrease fees. These results point to investors inferring managerial ability from a noisy signal of performance and rewarding them appropriately.

We find that increase in management fees have a significant impact on future fund flows. In particular, a large increase in management fee leads to a significant subsequent decrease in fund flows. This seems to mitigate the negative effects of diseconomies of scale since funds that increase their management fee substantially are able to maintain their superior past performance. A small increase in management fee does not stem off higher fund flows and thus is followed by a deterioration of performance. Furthermore, relative to a control group matched by the propensity score, funds that increase management fees have significantly higher risk subsequently. Finally, an increase in incentive fee is followed by a significant decline in fund performance.

Overall, our results provide important insights on how fees are determined in the hedge fund industry, and on the intertwined relations among the fees, fund flow, performance, and risk.

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Table 1: **Descriptive Statistics**

This table provides descriptive statistics hedge fund contract terms over our sample of US dollar denominated hedge funds over the period of 2001-2009. Mgt. fee and inc. fee give the magnitude of management and incentive fees respectively. Leverage is an indicator variable equal to 1 when the fund uses leverage. High-water mark is an indicator variable equal to 1 when there is a high-water mark provision for charging incentive fee. Minimum investment is the minimum amount an investor has to invest in a hedge fund. Personal capital is an indicator variable set to 1 when the fund manager invests her own money in the fund. Lockup period is the period over which investors cannot withdraw their investment. Fund age is time since the inception of the fund. Family age is time since the inception of the first fund of the hedge fund family.

			Percentile			Number of
	Mean	Std. Dev.	1st	50th	99th	Observations
Mgt. Fee (%)	1.44	0.61	0.00	1.50	3.50	22,473
Inc. Fee (%)	15.98	7.27	0.00	20.00	25.00	22,476
Leverage (0/1)	0.58	0.49	0.00	1.00	1.00	22,476
High-water Mark (0/1)	0.68	0.47	0.00	1.00	1.00	22,476
Minimum Investment (USD '000)	1,217	13,792	1	500	10,000	22,421
Personal Capital (0/1)	0.32	0.47	0.00	0.00	1.00	22,476
Lockup Period (months)	3.76	7.09	0.00	0.00	25.00	22,476
Fund Age (months)	72.37	51.87	6.00	59.00	236.00	22,043
Family Age (months)	105.46	64.07	10.00	96.00	308.00	21,914

Table 2: **Pattern of Fee Changes**

This table shows number of instances of management and incentive fee increase and decrease for a sample of US dollar denominated hedge funds over the period of 2001-2009.

Panel A: By Year

Year	Total	Mgt. Fee		Inc. Fee		Both		Mgt. Fee Up Inc. Fee Down	Mgt. Fee Down Inc. Fee Up
		Up	Down	Up	Down	Up	Down		
2002	21	9	3	7	2	0	0	0	0
2003	121	51	26	20	9	3	4	6	2
2004	103	41	19	17	12	5	0	5	4
2006	153	98	17	11	10	8	1	5	3
2007	43	20	11	3	3	3	1	0	2
2008	96	54	21	2	4	4	2	9	0
2009	122	24	42	29	10	4	6	7	0
Total	659	297	139	89	50	27	14	32	11

Panel B: By Investment Style

Style	Total	Mgt. Fee		Inc. Fee		Both		Mgt. Fee Up Inc. Fee Down	Mgt. Fee Down Inc. Fee Up
		Up	Down	Up	Down	Up	Down		
Convertible Arbitrage	20	9	3	4	1	0	2	1	0
Dedicated Short Bias	6	3	2	0	0	1	0	0	0
Emerging Markets	43	22	3	7	3	0	3	1	4
Equity Mkt Neutral	43	20	8	3	4	0	2	6	0
Event Driven	53	36	7	2	3	1	2	2	0
Fixed Inc Arbitrage	24	13	5	3	1	1	0	0	1
Fund of Funds	198	53	57	33	22	12	3	15	3
Global Macro	35	10	13	4	5	2	0	1	0
Long/Short Equity	159	93	26	21	7	8	1	2	1
Managed Futures	43	18	8	8	3	0	1	3	2
Multi-Strategy	34	19	7	4	1	2	0	1	0
Options Strategy	1	1	0	0	0	0	0	0	0
Total	659	297	139	89	50	27	14	32	11

Table 3: **Magnitude of Fee Changes**

For a sample of US dollar denominated hedge funds that changed fees over the period of 2001-2009, this table provides magnitude of management and incentive fees prior to change and magnitude of fee change.

Panel A: Management Fee Increase

	Mean	Median	Smallest	Largest
Prior Mgt. Fee (%)	1.04	1.00	0.00	3.00
Mgt. Fee Change (%)	0.69	0.50	0.05	3.50

Panel B: Management Fee Decrease

	Mean	Median	Smallest	Largest
Prior Mgt. Fee (%)	1.73	1.50	0.40	8.00
Mgt. Fee Change (%)	-0.65	-0.50	-0.05	-2.50

Panel C: Incentive Fee Increase

	Mean	Median	Smallest	Largest
Prior Inc. Fee (%)	8.70	1.00	0.00	33.00
Inc. Fee Change (%)	10.73	10.00	0.25	33.00

Panel D: Incentive Fee Decrease

	Mean	Median	Smallest	Largest
Prior Inc. Fee (%)	18.26	20.00	1.00	30.00
Inc. Fee Change (%)	-8.78	-5.00	-0.50	-30.00

Table 4: **Determinants of Initial Fees**

This table presents the results on the setting of initial management and incentive fees using ordered probit regressions. The sample consists of first snap shots of fees for funds with age less than 2 years. Initial management (incentive) fee is classified as high, at-median or low using median management (incentive) fee for the same investment style. Dependent variable is set at 2, 1 or 0 when the fee is high, at-median or low respectively. For Young (Small) Family is an indicator variable that equals one if the family age (assets) at the inception year is below the average family age (assets) for all fund families in that year. The probabilities are modelled for High management fee and High incentive fee. Leverage is 1 if the fund has leverage and 0 otherwise. Other variables are defined in the caption of Table 1.

	Mgt. Fee		Inc. Fee	
High Inc. Fee	0.046	0.053		
	(0.57)	(0.55)		
Low Inc. Fee	-0.540***	-0.554***		
	(-8.68)	(-7.20)		
High Mgt. Fee			0.573***	0.514***
			(5.07)	(3.77)
Low Mgt. Fee			-0.287***	-0.331***
			(-2.72)	(-2.62)
Young Family	0.058		0.248***	
	(1.23)		(2.59)	
Small Family		-0.145***		0.262**
		(-2.65)		(2.24)
Log Minimum Investment	0.022**	-0.061***	0.085***	0.087***
	(2.34)	(-3.75)	(4.85)	(2.64)
Log Lockup	-0.020	-0.009	-0.060	-0.042
	(-1.11)	(-0.42)	(-1.60)	(-0.96)
High-water Mark	-0.214***	-0.111	1.610***	1.679***
	(-3.55)	(-1.52)	(14.76)	(12.54)
Leverage	0.116***	0.091*	0.374***	0.381***
	(2.65)	(1.77)	(4.10)	(3.48)
Personal Capital	-0.037	-0.055	0.265**	0.223*
	(-0.70)	(-0.91)	(2.33)	(1.68)
Obervations	2872		2872	
Low Fee	1041		531	
At Median	952		2128	
High Fee	879		213	

z-statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5: **Initial Fees and Subsequent Survival and Performance**

This table presents the results on the relations between initial fee structure and subsequent fund survival and risk-adjusted performance. The sample includes all US dollar denominated hedge funds less than 2 years old, that first appeared in TASS between 2001 and 2007. Survival is 0 if a fund dropped out of the TASS database within 2 years of the initial appearance due to reasons other than merger or closure to new investors, 1 otherwise. Fund survival is modelled using a probit regression. Performance is the average monthly style-adjusted return during the three-year period following the first snapshot. The performance regression has been corrected for the survivalship bias using the Heckman procedure. Low-Mgt-High-Inc is an indicator equal to 1 when management fee is below its style median and incentive fee is above its style median. Young (Small) Family is an indicator variable that equals one if the family age (assets) at the inception year is below the average family age (assets) for all fund families in that year. Leverage is 1 if the fund has leverage and 0 otherwise. Other variables are defined in the caption of Table 1. Last two rows present the sum of indicated coefficients and its significance.

	Fund Survival	Performance	Fund Survival	Performance
Low-Mgt-High-Inc (1)	-0.176	0.083	-0.370	0.129
	(-0.61)	(0.55)	(-1.05)	(0.64)
Young Family (2)	-0.233***	-0.144***		
	(-3.36)	(-3.05)		
Low-Mgt-High-Inc*Young Family (3)	0.842**	0.371*		
	(2.17)	(1.67)		
Small Family (2)			-0.122	-0.024
			(-1.61)	(-0.50)
Low-Mgt-High-Inc*Small Family (3)			1.186**	0.265
			(2.48)	(1.02)
Log Minimum Investment	-0.025	-0.004	-0.042	-0.009
	(-1.00)	(-0.26)	(-1.48)	(-0.50)
Log Lockup	-0.021	0.024	0.019	0.033*
	(-0.80)	(1.30)	(0.68)	(1.66)
High-water Mark	-0.009	-0.106	0.016	-0.095
	(-0.09)	(-1.58)	(0.14)	(-1.28)
Leverage	-0.074	-0.079*	-0.054	-0.082*
	(-1.18)	(-1.80)	(-0.76)	(-1.75)
Personal Capital	-0.012	0.059	0.014	0.069
	(-0.16)	(1.13)	(0.17)	(1.24)
Year Fixed Effects	Yes	No	Yes	No
Style Fixed Effects	Yes	No	Yes	No
Observations	1797	1102	1459	978
Joint Test:				
(1)+(2)+(3)	0.433	0.310*	0.694**	0.370**
(1)+(3)	0.666**	0.454***	0.816**	0.394**

z-statistics in parentheses for fund survival regressions and t-statistics in parentheses for performance regressions. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6: **Determinants of Management Fee Changes**

This table shows the results of a multinomial logistic regression explaining instances of fund closures and changes in management fee. Performance and Std. Dev. are average and standard deviation respectively of monthly style-adjusted return over prior three years or one year. High Std. Dev. is an indicator variable set to 1 if Std. Dev. is above its mean. Fund flow is average monthly rate of new money flow over prior three years or one year. Prior mgt. fee and prior inc. fee are management and incentive fee from the previous year adjusted by respective style medians. Leverage is 1 if the fund has leverage and 0 otherwise. Other variables are defined in the caption of Table 1. The regressions include style and year fixed effects.

	Base Outcome: Management Fee Unchanged					
	3-Year			1-Year		
	Fund Closure	Fee Decrease	Fee Increase	Fund Closure	Fee Decrease	Fee Increase
Performance	-0.793***	-0.747*	0.721***	-0.519***	-0.327**	0.334***
	(-8.14)	(-1.78)	(4.04)	(-8.42)	(-1.99)	(2.60)
Std. Dev.	0.039**	-0.075	0.060*	0.031**	-0.090	0.060*
	(2.48)	(-0.89)	(1.85)	(1.99)	(-0.98)	(1.88)
Fund Flow	-0.021***	-0.009	0.023	-0.039***	0.012	0.029**
	(-2.61)	(-0.23)	(1.45)	(-5.53)	(0.53)	(2.21)
Performance*High Std. Dev	0.613***	0.569	-0.600***	0.452***	0.280	-0.336**
	(5.72)	(1.27)	(-3.17)	(6.74)	(1.39)	(-2.44)
Prior Mgt. Fee	0.171***	0.638***	-1.618***	0.120**	0.553***	-1.561***
	(3.16)	(4.16)	(-8.71)	(2.35)	(3.92)	(-8.99)
Prior Inc. Fee	-0.001	0.017	-0.010	-0.003	-0.008	-0.014
	(-0.08)	(0.48)	(-0.90)	(-0.52)	(-0.25)	(-1.35)
Log Fund TNA	-0.269***	0.101	-0.057	-0.283***	0.040	-0.018
	(-9.11)	(0.83)	(-0.72)	(-10.30)	(0.36)	(-0.25)
Log Fund Age	-0.479***	-0.245	0.007	-0.362***	-0.030	0.062
	(-6.60)	(-0.66)	(0.04)	(-7.01)	(-0.14)	(0.52)
Log Family TNA	0.091***	0.073	0.279***	0.094***	0.066	0.264***
	(3.87)	(0.59)	(3.57)	(4.33)	(0.59)	(3.58)
Log Lockup	-0.039	-0.008	0.045	-0.042*	-0.059	0.060
	(-1.43)	(-0.07)	(0.66)	(-1.66)	(-0.50)	(0.97)
Log Minimum Investment	0.100***	-0.088	0.119*	0.064**	-0.070	0.070
	(3.59)	(-0.99)	(1.69)	(2.36)	(-0.91)	(1.13)
Leverage	0.012	0.015	-0.130	0.065	-0.100	-0.142
	(0.18)	(0.05)	(-0.79)	(1.02)	(-0.35)	(-0.92)
Personal Capital	-0.187***	0.455	0.336*	-0.260***	0.374	0.274*
	(-2.68)	(1.50)	(1.93)	(-3.92)	(1.32)	(1.68)
High-water Mark	-0.175**	0.076	0.377*	-0.215***	0.086	0.511**
	(-2.25)	(0.20)	(1.82)	(-2.90)	(0.25)	(2.50)
Observations	8812			9863		
Pseudo R^2	0.103			0.107		

Robust z-statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7: **Determinants of Incentive Fee Changes**

This table shows the results of a multinomial logistic regression explaining instances of fund closures and changes in incentive fee. Performance and Std. Dev. are average and standard deviation respectively of monthly style-adjusted return over prior three years or one year. High Std. Dev. is an indicator variable set to 1 if Std. Dev. is above its mean. Fund flow is average monthly rate of new money flow over prior three years or one year. Prior mgt. fee and prior inc. fee are management and incentive fee from the previous year adjusted by respective style medians. Leverage is 1 if the fund has leverage and 0 otherwise. Other variables are defined in the caption of Table 1. The regressions include style and year fixed effects.

	Base outcome: Incentive Fee Unchanged					
		3-Year			1-Year	
	Fund Closure	Fee Decrease	Fee Increase	Fund Closure	Fee Decrease	Fee Increase
Performance	-0.786***	0.607	0.195	-0.516***	-0.018	0.094
	(-8.07)	(1.60)	(0.49)	(-8.41)	(-0.04)	(0.32)
Std. Dev.	0.039**	-0.173	-0.213**	0.032**	-0.152	-0.084
	(2.47)	(-1.25)	(-2.57)	(2.06)	(-1.17)	(-0.99)
Fund Flow	-0.020**	-0.076	-0.003	-0.039***	-0.011	-0.000
	(-2.55)	(-1.55)	(-0.09)	(-5.49)	(-0.30)	(-0.02)
Performance*High Std. Dev	0.608***	-0.626	0.348	0.449***	-0.022	0.202
	(5.67)	(-1.54)	(0.84)	(6.75)	(-0.06)	(0.60)
Prior Mgt. Fee	0.173***	-0.291	-0.296	0.119**	-0.233	-0.149
	(3.20)	(-1.49)	(-1.03)	(2.36)	(-1.28)	(-0.64)
Prior Inc. Fee	-0.000	0.155***	-0.257***	-0.003	0.158***	-0.247***
	(-0.04)	(6.50)	(-5.89)	(-0.47)	(7.52)	(-6.70)
Log Fund TNA	-0.269***	0.061	0.338*	-0.284***	0.054	0.374**
	(-9.11)	(0.27)	(1.77)	(-10.33)	(0.30)	(2.15)
Log Fund Age	-0.476***	0.015	-0.315	-0.360***	0.354	-0.136
	(-6.57)	(0.03)	(-0.84)	(-6.99)	(0.88)	(-0.48)
Log Family TNA	0.094***	0.040	-0.167	0.097***	0.103	-0.195
	(3.92)	(0.21)	(-0.88)	(4.41)	(0.62)	(-1.11)
Log Lockup	-0.039	-0.115	-0.050	-0.042*	-0.101	-0.005
	(-1.43)	(-0.54)	(-0.30)	(-1.66)	(-0.49)	(-0.03)
Log Minimum Investment	0.099***	-0.042	-0.053	0.063**	-0.194	0.008
	(3.54)	(-0.24)	(-0.66)	(2.33)	(-1.18)	(0.11)
Leverage	0.018	-0.356	0.772**	0.069	-0.083	0.670**
	(0.26)	(-0.87)	(2.15)	(1.10)	(-0.20)	(1.97)
Personal Capital	-0.188***	0.155	-0.243	-0.260***	0.642	-0.286
	(-2.69)	(0.30)	(-0.56)	(-3.91)	(1.22)	(-0.70)
High-water Mark	-0.179**	-0.097	1.330*	-0.217***	-0.068	1.038
	(-2.29)	(-0.18)	(1.87)	(-2.93)	(-0.14)	(1.57)
Observations	8634			9666		
Pseudo R^2	0.107			0.115		

Robust z-statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 8: **Determinants of Management Fee Decrease: Heckman Correction**

This table shows the results of a probit regression explaining instances of decrease in management fee after controlling for the selection bias using the Heckman procedure. The first stage models probability of fund survival while the second stage models the probability of fee decrease controlling for survival. Performance and Std. Dev. are average and standard deviation respectively of monthly style-adjusted return over prior three years or one year. High Std. Dev. is an indicator variable set to 1 if Std. Dev. is above its mean. Fund flow is average monthly rate of new money flow over prior three years or one year. Prior mgt. fee and prior inc. fee are management and incentive fee from the previous year adjusted by respective style medians. Leverage is 1 if the fund has leverage and 0 otherwise. Other variables are defined in the caption of Table 1. The regressions include style and year fixed effects.

	3-Year		1-Year	
	Fee Decrease	Fund Survives	Fee Decrease	Fund Survives
Performance	-0.352**	0.430***	-0.177***	0.276***
	(-2.28)	(8.08)	(-2.58)	(8.02)
Std. Dev.	-0.026	-0.022***	-0.027	-0.020**
	(-0.87)	(-2.58)	(-0.88)	(-2.50)
Fund Flow	-0.000	0.011**	0.003	0.021***
	(-0.04)	(2.56)	(0.37)	(5.81)
Performance*High Std. Dev	0.272*	-0.336***	0.148*	-0.238***
	(1.69)	(-5.75)	(1.96)	(-6.49)
Prior Mgt. Fee	0.278***	-0.101***	0.241***	-0.075***
	(4.89)	(-3.46)	(4.37)	(-2.74)
Prior Inc. Fee	0.008	0.001	-0.004	0.002
	(0.68)	(0.20)	(-0.33)	(0.59)
Log Fund TNA		0.148***		0.155***
		(8.99)		(10.10)
Log Fund Age		0.263***		0.206***
		(6.66)		(7.26)
Log Family TNA		-0.046***		-0.049***
		(-3.43)		(-3.97)
Log Lockup		0.023		0.024*
		(1.56)		(1.71)
Log Minimum Investment		-0.058***		-0.037***
		(-3.79)		(-2.60)
Leverage		-0.004		-0.032
		(-0.12)		(-0.91)
Personal Capital		0.107***		0.142***
		(2.82)		(3.93)
High-water Mark		0.109**		0.132***
		(2.55)		(3.22)
Observations	7466	8812	8297	9863

Robust z-statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 9: **Determinants of Incentive Fee Decrease: Heckman Correction**

This table shows the results of a probit regression explaining instances of decrease in incentive fee after controlling for the selection bias using the Heckman procedure. The first stage models probability of fund survival while the second stage models the probability of fee decrease controlling for survival. Performance and Std. Dev. are average and standard deviation respectively of monthly style-adjusted return over prior three years or one year. High Std. Dev. is an indicator variable set to 1 if Std. Dev. is above its mean. Fund flow is average monthly rate of new money flow over prior three years or one year. Prior mgt. fee and prior inc. fee are management and incentive fee from the previous year adjusted by respective style medians. Leverage is 1 if the fund has leverage and 0 otherwise. Other variables are defined in the caption of Table 1. The regressions include style and year fixed effects.

	3-Year		1-Year	
	Fee Decrease	Fund Survives	Fee Decrease	Fund Survives
Performance	0.184	0.425***	-0.101	0.272***
	(1.02)	(7.90)	(-0.86)	(7.94)
Std. Dev.	-0.061	-0.023***	-0.028	-0.021***
	(-1.31)	(-2.69)	(-0.78)	(-2.61)
Fund Flow	-0.030**	0.010**	-0.018*	0.021***
	(-2.21)	(2.46)	(-1.68)	(5.68)
Performance*High Std. Dev	-0.205	-0.330***	0.059	-0.235***
	(-1.16)	(-5.62)	(0.51)	(-6.41)
Prior Mgt. Fee	-0.113	-0.096***	-0.051	-0.069**
	(-1.24)	(-3.20)	(-0.75)	(-2.46)
Prior Inc. Fee	0.063***	-0.000	0.053***	0.002
	(5.93)	(-0.03)	(5.53)	(0.46)
Log Fund TNA		0.149***		0.156***
		(8.94)		(10.00)
Log Fund Age		0.263***		0.205***
		(6.67)		(7.26)
Log Family TNA		-0.051***		-0.053***
		(-3.77)		(-4.22)
Log Lockup		0.022		0.023
		(1.44)		(1.61)
Log Minimum Investment		-0.056***		-0.038***
		(-3.68)		(-2.64)
Leverage		-0.007		-0.031
		(-0.19)		(-0.90)
Personal Capital		0.099***		0.141***
		(2.61)		(3.89)
High-water Capital		0.107**		0.125***
		(2.48)		(3.05)
Observations	7288	8634	8100	9666

Robust z-statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 10: **Performance, Flow, and Volatility around Management Fee Increase**

This table examines fund performance, flow and return volatility around an increase in management fee. In Panel A, the dependent variables are average monthly style-adjusted return, fund flow, and the standard deviation of monthly style-adjusted returns in each year. Before and After are indicators set to 1 respectively before and after management fee increase, 0 otherwise. Fee change is the magnitude of management fee increase. Prior mgt. fee and prior inc. fee are management and incentive fee from the previous year adjusted by respective style medians. Fund TNA are total net assets of the fund while Family TNA are the total net assets of the fund family. Leverage is 1 if the fund has leverage and 0 otherwise. Other variables are defined in the caption of Table 1. The control variables are lagged by one year. Results for F-tests for difference between Before vs. After, using various level of fee changes are reported in Panel B.

Panel A: Regression Results

	Return		Flow		Volatility	
Before (1)	0.242***	0.242***	1.337***	1.338***	0.038	0.037
	(6.12)	(6.12)	(6.20)	(6.20)	(0.46)	(0.45)
After (2)	0.070	-0.141	0.195	1.258**	0.109	-0.311*
	(1.19)	(-1.05)	(0.85)	(2.32)	(1.30)	(-1.71)
After*Fee Change (3)		0.312*		-1.580**		0.622**
		(1.73)		(-2.21)		(2.15)
Prior Mgt. Fee	0.041**	0.040*	0.015	0.021	0.203***	0.201***
	(1.97)	(1.91)	(0.19)	(0.27)	(5.52)	(5.45)
Prior Inc. Fee	-0.001	-0.001	-0.023***	-0.023**	0.017***	0.017***
	(-0.37)	(-0.39)	(-2.59)	(-2.57)	(4.03)	(4.00)
Flow	0.004**	0.004**			-0.006**	-0.006**
	(2.07)	(2.09)			(-2.48)	(-2.42)
Return			1.171***	1.173***	0.086***	0.085***
			(24.66)	(24.71)	(5.17)	(5.12)
Return Volatility			-0.187***	-0.186***		
			(-5.45)	(-5.43)		
Log Fund TNA	-0.018*	-0.018*	-0.142***	-0.142***	-0.063***	-0.063***
	(-1.82)	(-1.82)	(-3.38)	(-3.38)	(-3.94)	(-3.96)
Log Family TNA	-0.006	-0.006	-0.156***	-0.158***	-0.074***	-0.073***
	(-0.66)	(-0.62)	(-3.73)	(-3.78)	(-4.73)	(-4.67)
Log Fund Age	0.044**	0.044**	-0.668***	-0.668***	-0.044	-0.043
	(2.06)	(2.07)	(-7.49)	(-7.50)	(-1.30)	(-1.27)
Log Family Age	-0.026	-0.026	-0.276***	-0.276***	0.103***	0.102***
	(-1.18)	(-1.18)	(-2.84)	(-2.84)	(2.89)	(2.88)
Log Minimum Investment	0.026***	0.026***	0.198***	0.198***	-0.041***	-0.040***
	(3.15)	(3.17)	(5.58)	(5.59)	(-2.70)	(-2.70)
Log Lockup	0.010	0.010	0.044	0.045	0.031**	0.030**
	(1.09)	(1.09)	(1.20)	(1.22)	(2.05)	(2.03)
Leverage	0.013	0.012	0.015	0.016	0.132***	0.132***
	(0.61)	(0.59)	(0.16)	(0.18)	(3.59)	(3.59)
High-water Mark	-0.016	-0.016	0.221**	0.218**	-0.041	-0.040
	(-0.61)	(-0.59)	(2.04)	(2.02)	(-0.88)	(-0.85)
Personal Capital	0.025	0.024	0.220**	0.221**	0.008	0.007
	(1.10)	(1.08)	(2.37)	(2.38)	(0.20)	(0.18)
Year and Style Fixed Effects	No	No	Yes	Yes	Yes	Yes
Observations	11,223	11,223	11,353	11,353	11,223	11,223

Panel B: F-test for Difference between After and Before

	Return		Flow		Volatility	
	Difference	p-value	Difference	p-value	Difference	p-value
Overall						
(2) - (1)	-0.172***	0.010	-1.142***	0.001	0.071	0.473
Fee Change=0.25%						
(2)+0.25*(3) - (1)	-0.305***	0.004	-0.475	0.278	-0.193	0.130
Fee Change=0.50%						
(2)+0.50*(3) - (1)	-0.227***	0.003	-0.870**	0.012	-0.037	0.691
Fee Change=1.00%						
(2)+1.00*(3) - (1)	-0.071	0.414	-1.660***	<0.001	0.274*	0.082

t-statistics based on standard errors clustered at fund level in parentheses for Panel A. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 11: **Performance, Flow, and Volatility: Propensity Score Matching**

This table examines fund performance, flow and return volatility around an increase in management fee. Funds that increased management fee (treatment funds) are matched to a sample of control funds using propensity scores based on determinants of management fee changes in Table 6. Difference, calculated as performance, flow or volatility of treatment funds minus that of the control funds, is examined at different levels of fee change. Performance is measured using average monthly style-adjusted return, flow using average monthly rate of fund flow, and volatility using the standard deviation of monthly style-adjusted returns, all measured at the annual interval. Fee change is the magnitude of management fee increase.

	Return	Flow	Volatility
Fee Change>=0			
Difference	0.230*	-0.635	0.499**
Observations	124	124	124
Fee Change>=0.25%			
Difference	0.232*	-0.552	0.528**
Observations	120	120	120
Fee Change>=0.50%			
Difference	0.283**	-0.773	0.674***
Observations	108	108	108
Fee Change>=1.00%			
Difference	0.541***	-1.115	1.584***
Observations	34	34	34

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 12: **Performance, Flow, and Volatility around Incentive Fee Increase**

This table examines fund performance, flow and return volatility around an increase in incentive fee. In Panel A, the dependent variables are average monthly style-adjusted return, fund flow, and the standard deviation of monthly style-adjusted returns in each year. Before and After are indicators set to 1 respectively before and after management fee increase, 0 otherwise. Fee change is the magnitude of incentive fee increase. Prior mgt. fee and prior inc. fee are management and incentive fee from the previous year adjusted by respective style medians. Fund TNA are total net assets of the fund while Family TNA are the total net assets of the fund family. Leverage is 1 if the fund has leverage and 0 otherwise. Other variables are defined in the caption of Table 1. The control variables are lagged by one year. Results for F-tests for difference between Before vs. After, using various level of fee changes are reported in Panel B.

Panel A: Regression Results

	Return		Flow		Volatility	
Before (1)	0.209**	0.209**	0.610*	0.610*	0.065	0.065
	(2.20)	(2.20)	(1.85)	(1.85)	(0.49)	(0.49)
After (2)	-0.078	-0.097	-0.193	-0.089	0.091	0.240
	(-0.90)	(-0.60)	(-0.49)	(-0.15)	(0.58)	(0.85)
After*Fee Change (3)		0.002		-0.010		-0.015
		(0.16)		(-0.28)		(-0.90)
Prior Mgt. Fee	0.039*	0.039*	0.018	0.018	0.195***	0.195***
	(1.80)	(1.80)	(0.23)	(0.23)	(5.07)	(5.06)
Low Inc. Fee	-0.001	-0.001	-0.020**	-0.020**	0.017***	0.017***
	(-0.54)	(-0.54)	(-2.39)	(-2.39)	(4.03)	(4.03)
Flow	0.005**	0.005**			-0.006**	-0.006**
	(2.40)	(2.40)			(-2.40)	(-2.40)
Return			1.161***	1.161***	0.084***	0.084***
			(24.00)	(24.00)	(4.83)	(4.83)
Return Volatility			-0.196***	-0.196***		
			(-5.73)	(-5.73)		
Log Fund TNA	-0.015	-0.015	-0.106**	-0.106**	-0.064***	-0.064***
	(-1.46)	(-1.46)	(-2.51)	(-2.50)	(-3.83)	(-3.83)
Log Family TNA	-0.005	-0.005	-0.180***	-0.180***	-0.071***	-0.071***
	(-0.46)	(-0.46)	(-4.27)	(-4.27)	(-4.43)	(-4.44)
Log Fund Age	0.049**	0.049**	-0.690***	-0.690***	-0.044	-0.044
	(2.26)	(2.26)	(-7.57)	(-7.57)	(-1.28)	(-1.28)
Log Family Age	-0.036	-0.036	-0.235**	-0.235**	0.105***	0.106***
	(-1.60)	(-1.60)	(-2.38)	(-2.37)	(2.90)	(2.91)
Log Minimum Investment	0.026***	0.026***	0.200***	0.200***	-0.043***	-0.043***
	(3.19)	(3.19)	(5.58)	(5.59)	(-2.82)	(-2.81)
Log Lockup	0.012	0.012	0.038	0.037	0.033**	0.033**
	(1.29)	(1.29)	(0.99)	(0.99)	(2.15)	(2.14)
Leverage	0.011	0.011	0.056	0.056	0.131***	0.131***
	(0.50)	(0.50)	(0.59)	(0.59)	(3.44)	(3.44)
High-water Mark	-0.023	-0.023	0.230**	0.230**	-0.040	-0.040
	(-0.84)	(-0.84)	(2.12)	(2.12)	(-0.84)	(-0.84)
Personal Capital	0.030	0.030	0.249***	0.249***	0.001	0.001
	(1.27)	(1.27)	(2.58)	(2.58)	(0.01)	(0.03)
Year and Style Fixed Effects	No	No	Yes	Yes	Yes	Yes
Observations	10,555	10,555	10,691	10,691	10,555	10,555

Panel B: F-test for Difference between After and Before

	Return		Flow		Volatility	
	Difference	p-value	Difference	p-value	Difference	p-value
Overall						
(2)- (1)	-0.287**	0.016	-0.803*	0.098	0.026	0.845
Fee Change=2%						
(2)+2*(3)-(1)	-0.302*	0.096	-0.719	0.261	0.145	0.450
Fee Change=5%						
(2)+5*(3)-(1)	-0.296*	0.092	-0.749	0.255	0.100	0.452
Fee Change=10%						
(2)+10*(3)-(1)	-0.286*	0.085	-0.799	0.243	0.025	0.460

t-statistics based on standard errors clustered at fund level in parentheses for Panel A. * significant at 10%; ** significant at 5%; *** significant at 1%.