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Working Paper

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CFR Working Paper, No. 07-02

Provided in Cooperation with:
Centre for Financial Research (CFR), University of Cologne

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- Evidence from the Mutual Fund Industry -

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Employment Risk, Compensation Incentives and Managerial Risk Taking: Evidence from the Mutual Fund Industry[*]

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This Version: May 2008

Abstract

We examine the influence on managerial risk taking of incentives due to employment risk and due to compensation. Our empirical investigation of the risk taking behavior of mutual fund managers indicates that managerial risk taking crucially depends on the relative importance of these incentives. When employment risk is more important than compensation incentives, fund managers with a poor midyear performance tend to decrease risk relative to leading managers to prevent potential job loss. When employment risk is low, compensation incentives become more relevant and fund managers with a poor midyear performance increase risk to catch up with the midyear winners.

JEL classifications: G23, M54

Keywords: Managerial Risk Taking, Employment Risk, Compensation Incentives, Mutual Funds, Restrictions

[*] The authors thank Nihat Aktas, Luc Bauwens, Wolfgang Bühler, Elena Carletti, Chitru Fernando, Gordon Gemmill, Joachim Grammig, Jan Krahnen, Ernst Maug, Bill Megginson, Jerry Parwada, Ernst-Ludwig von Thadden, Pradeep Yadav, and seminar participants at the University of Frankfurt (Main), Catholic University of Louvain, University of Mannheim, University of Oklahoma, and University of Warwick for helpful comments and suggestions. An earlier version of the paper was presented at the European Economic Association Meeting 2007. This paper has benefited greatly from the advice of an anonymous referee. Thiele gratefully acknowledges financial support from the German Research Foundation (DGF).

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1. Introduction

We analyze mutual fund managers' risk taking decisions in response to the incentives they face.[1] In making their investment decisions, fund managers face two main incentives. First, they want to earn high compensation. Second, they want to keep their jobs, i.e., do not want to be laid off. We examine how these incentives, which we term 'compensation incentives' and 'employment incentives', respectively, determine the fund managers' risk taking behavior. We show that it depends on the interim performance of the funds they manage: compensation incentives lead managers of funds with a poor interim performance to increase their fund's risk relative to managers of funds with a good interim performance. In contrast, employment incentives lead managers of funds with a poor interim performance to decrease their fund's risk relative to managers of funds with a good interim performance.

We start our discussion with an analysis of the incentives for poorly performing fund managers ("losers"), before turning to a description of the incentives for well performing fund managers ("winners"). Brown, Harlow, and Starks (1996) are the first to examine risk taking incentives of mutual fund managers in a yearly tournament setting. They exclusively focus on implicit compensation incentives that arise due to the positive convex relationship between the inflow of new money into the fund and its past performance (e.g., Sirri and Tufano, 1998).[2] As the fund family typically

1 We focus on incentives for the person managing the fund, which we call 'fund manager', rather than incentives for the fund management company, which we call 'fund family'. We focus on the fund manager rather than the fund family, because it is the fund manager who ultimately makes the risk taking decisions at the fund level.

2 Explicit incentive contracts are not very common in the mutual fund industry (Elton, Gruber, and Blake, 2003). The impact of changes in explicit incentive fees on portfolio decisions is analyzed in Golec and Starks (2004). The impact of explicit incentive contracts on risk taking

charges a fixed percentage management fee on its assets under management, the fund family profits from funds that reach a top position by the end of the year and eventually attract new inflows. However, the fund manager also benefits from reaching a top position by the end of the year since a fund manager's compensation typically depends on past performance as well as on the size of the fund managed by her (see, e.g., Khorana, 1996; Farnsworth and Taylor, 2006). As fund size is mechanically linked to inflows, there is also a convex relationship between the fund's past performance and the compensation of the fund's manager. Such a convex relationship could lead to yearly tournaments among fund managers: midyear losers increase their funds' risk in the second part of the year since they have not much to lose from a further deterioration of their position in terms of inflows and eventually compensation, while increasing risk increases their chance of catching up with the midyear winners (Brown, Harlow, and Starks, 1996).

However, there is an additional incentive that fund managers face and which is neglected in the previous literature on fund manager tournaments: fund managers are concerned about keeping their jobs. Fund managers care about employment incentives because losing their jobs would entail significant costs in terms of foregone income, loss in reputation, and loss of future job opportunities. We expect that these employment incentives are taken into consideration by fund managers in making portfolio risk decisions and thus become vital in explaining risk taking strategies. If a manager takes on too high a risk (perhaps because of tournament incentives), then there is also a higher risk of poor performance and the probability of forced turnover

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in the hedge fund industry, where such contracts are very common, is examined in Agarwal and Naik (2004).

is much higher for fund managers with poor past performance, i.e., particularly midyear losers face a serious threat of being laid off (Khorana, 1996; Chevalier and Ellison, 1999; Hu, Hall, and Harvery, 2000).[3] Thus, if midyear losers follow risky strategies in the second part of the year, they increase the probability of achieving a performance that is so bad that it would eventually trigger job loss (Bloom and Milkwovich, 1998). Consequently, employment incentives should cause midyear losers to decrease their risk, ceteris paribus.[4]

Consider now the incentives for midyear winners, which are markedly different from those of midyear losers described above. On the one hand, compensation incentives lead midyear winners to try to lock in their leading position and play it safe rather than to increase their risk. On the other hand, employment incentives are of much less, if any, relevance for them. They face no serious threat of dismissal due to poor performance. Thus, unlike midyear losers, they have no reason to change their risk due to employment incentives.

Our analysis so far shows that employment incentives and compensation incentives lead to diametrically opposite hypotheses regarding managerial risk taking. Compensation incentives should lead midyear losers to increase their risk relative to midyear winners. Employment incentives should lead midyear losers to decrease their

3 There is also a large body of empirical research showing a negative relationship between performance and termination risk for managers of industrial companies (e.g., Coughlan and Schmidt, 1985; Gilson, 1989; Murphy and Zimmerman, 1993).

4 For fund managers with extremely bad performance after the first half of the year, there might also be an incentive to 'gamble for resurrection' (Hu, Kale, Pagani and Subramaniam, 2008). However, the 'gamble for resurrection' argument is only strong if fund managers are myopic, i.e., if they do not take into account their chance of finding a new job after being laid off. If they are not myopic, they are less inclined to gamble for resurrection, because this increases the likelihood of a catastrophic performance (entailing a complete destruction of the manager's reputation) and eventually of never finding a new job in the industry again. In order not to complicate the analysis, we refrain from including such extreme incentives.

risk relative to midyear winners. The relative strength of employment incentives and compensation incentives depends on the expected costs of job loss as well as on the expected increase in compensation due to reaching a top position.

Market returns are a simple but ideal proxy for the relative strength of these two incentives because they capture the market environment the fund managers face. The reasoning is as follows: after bear markets aggregate inflows into funds are generally low (e.g., Karceski, 2002, and Breuer and Stotz, 2007). Therefore, the fund manager attracts little new money for her fund by reaching a top position. As a consequence, even the size of the best performing funds grows only slightly, the fund family earns little additional fee income and eventually is not very profitable. Both effects lead to weak compensation incentives for fund managers in bear markets: as the fund manager's personal compensation is positively related to fund size, the manager makes little additional income by reaching a top position. Furthermore, the bonus payments the fund manager receives depend heavily on the profitability of the fund family (Farnsworth and Taylor, 2006), which is low in bear markets. Based on these observations, Karceski (2002) argues that fund managers do not care much about outperforming other fund managers during bear markets, i.e., compensation incentives are weak in bear markets. In contrast, employment incentives are strong in bear markets. The low aggregate inflows into mutual funds after bear markets eventually lead to many fund closures, primarily of badly performing funds (Zhao, 2005b). Thus, the threat that the fund of a poorly performing manager will be closed down is more severe in bear markets, resulting in a higher probability of job loss. Chevalier and Ellison (1999) show that job loss is indeed more likely after bear markets than after bull markets.[5] They conjecture that the reason for this finding is that fund companies are less profitable and have to cut back costs after low inflows and thus lay off fund managers. At the same time, fewer new funds are started (Zhao, 2005a) and a fund manager might face difficulties in finding a new job in the fund industry if she actually loses her job.[6] Following this line of reasoning, we expect employment incentives to be strong and compensation incentives to be weak in bear markets.

In contrast, we expect compensation incentives to be strong and employment incentives to be weak in bull markets for the following reasons: aggregate flows into the mutual fund market are high after bullish markets. Thus, the additional inflows and eventually the compensation that a fund manager can capture by achieving a top position are high in this case. Furthermore, since fund families are typically more profitable in bull markets, the bonuses for well performing fund managers are particularly high (Farnsworth and Taylor, 2006). Consequently, compensation incentives are strong in this case. In contrast, employment incentives are weak: there are few fund closures after bull markets (Zhao, 2005b), making it unlikely that a manager loses her job due to a closure. Moreover, the probability of job loss for fund managers is generally lower in bull markets (Chevalier and Ellison, 1999). At the same time, a lot of new funds and even entirely new fund families are founded (Zhao, 2005a; Faff, Parwada, and Fang, 2006). Thus, the threat of dismissal is not severe because there are many alternative job options available even if a fund manager loses

5 The result that termination is more likely for fund managers after bear market years, reported in Chevalier and Ellison (1999), also holds true in our sample. In unreported tests, we find that termination probability does significantly negatively depend on previous market returns in our sample. All results not explicitly reported in the paper are available from the authors upon request.

6 There is also some empirical evidence from the corporate sector that shows that being displaced in recessions leads to particularly large permanent income losses (e.g., Jacobson, LaLonde, and Sullivan, 1993; Krebs, 2007).

her job. Therefore, employment incentives are relatively weak in this case, while compensation incentives are strong.

From this analysis, we conclude that which incentive dominates is contingent on the market performance. Compensation incentives are more likely to dominate in bull markets, while employment incentives are more likely to dominate in bear markets. Furthermore, we expect that the more bullish (bearish) the markets are, the more pronounced is the impact of compensation (employment) incentives. Thus, our main hypotheses are:

Hypothesis 1: In bull markets compensation incentives dominate and managers of funds with a poor midyear performance increase fund risk more than managers of funds with a good midyear performance.

Hypothesis 2: In bear markets employment incentives dominate and managers of funds with a poor midyear performance increase fund risk less than managers of funds with a good midyear performance.

Hypothesis 3: The more bullish (bearish) the markets are, the more (less) pronounced is the increase in fund risk of managers of funds with a poor midyear performance relative to managers of funds with a good midyear performance.

One important consideration in testing these hypotheses is estimating the managers' ex ante risk choices. Thus, we use portfolio holdings data of US equity mutual funds (over the period 1980 to 2003) because holdings data allows us to capture the intended risk taking strategies of fund managers rather than the realized ones. The latter, captured from return data, might be partly driven by unexpected changes in stock risk.

Our results support all three hypotheses. In bull markets midyear losers increase risk more than midyear winners. In bear markets midyear losers increase risk less than midyear winners. The extent of managers' risk adjustment is larger the more bullish or bearish the market is. These findings show that ignoring the interplay between employment incentives and compensation incentives can easily yield misleading results. Our results have implications for fund investors and fund families as well as regulatory authorities.

Our findings are stable over time and hold after controlling for fund, fund family, and market segment characteristics that might influence the risk taking behavior of fund managers. They also hold after taking into account the impact of risk limits fund managers might face. Fund managers might be forced to adjust their risk, if they unintentionally exceed those limits. Such violations of risk limits can happen because risk cannot be predicted completely reliably and realized risk eventually deviates from intended risk. We do find that fund managers counterbalance such risk surprises by adjusting their risk. We also find some evidence consistent with the notion that managers with high tenure care less about compensation incentives than younger managers. However, all these effects do not change our main results.

Our study is related to three strands of research. First, we contribute to the general literature on managerial risk taking in response to compensation incentives (e.g., Cohen, Hall, and Viceira, 2000; Rajgopal and Shevlin, 2002; Coles, Daniel, and Naveen, 2006). For the mutual fund industry, Brown, Harlow, and Starks (1996) provide empirical evidence that managers respond to implicit compensation incentives that arise due to the convex performance flow relationship. This finding is confirmed in several follow-up studies, like Koski and Pontiff (1999), Elton, Gruber, and Blake (2003), Qiu (2003), Hu, Kale, Pagani, and Subramaniam (2008). However, Brown, Harlow, and Starks (1996) and Kempf and Ruenzi (2008) report that the risk taking behavior of fund managers is not stable over time. Our study reconciles the partially contradictory evidence provided in earlier studies by showing that the relative strength of compensation incentives and employment incentives drives risk taking behavior of fund managers. We also show that not taking both incentives into consideration can lead to incorrect conclusions.

Second, we contribute to the literature on employment incentives and risk taking. There are few empirical studies on this issue. Chakraborty, Sheikh, and Subramanian (2007) analyze the behavior of managers of industrial firms and show that managers who face high employment risk make less risky decisions than managers who face low employment risk. Looking at analysts' behavior, Hong and Kubik (2003) and Clarke and Subramanian (2006) find that analysts who face greater employment risk issue more conservative forecasts. Chevalier and Ellison (1999) examine the career concerns of fund managers and argue that "the desire to avoid termination is the most important career concern" (p. 426). Our study contributes to this literature by showing that fund managers adjust risk in response to employment incentives in systematic ways.

Finally, we contribute to the recent literature on the role of restrictions in the mutual fund industry (e.g., Almazan, Brown, Carlson, and Chapman, 2004) by showing that the response to risk surprises is an important factor driving managerial risk taking. To the best of our knowledge our study is the first to explicitly examine reactions of managers to unintended risk realizations.

The rest of this article is organized as follows: the next section introduces the data and details how the intended risk taking of fund managers is calculated. In Section 3, we empirically examine the influence of compensation and employment incentives on managerial risk taking. In Section 4, we analyze other potential drivers of risk taking. In particular, we examine the robustness of our results by taking into account the impact of risk surprises the fund manager might face. In addition, we look at the impact of characteristics of the fund, the fund family, the market segment, and the fund manager on managerial risk taking. Section 5 concludes.

2. Methodology

2.1. Data

Our analysis is based on three comprehensive databases: the Thomson Financial Mutual Fund Holdings database (formerly known as CDA/Spectrum), the CRSP Survivor-Bias Free US Mutual Fund database[7], and the CRSP US Stock database. The Thomson Financial Mutual Fund Holdings database includes information on US mutual funds from 1975 on. Portfolio holdings for each fund are stated either quarterly or semi-annually.[8] However, information on the reporting date of the

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7 Source: CRSP™, Center for Research in Security Prices. Graduate School of Business, The University of Chicago. Used with permission. All rights reserved crsp.uchicago.edu. For a more detailed description of the CRSP database, see Carhart (1997) and Elton, Gruber, and Blake (2001).

8 Until 1985 the SEC required quarterly reports. In 1985 the mandatory portfolio disclosure frequency was reduced from every quarter to every six months. In 2004 the SEC increased the mandatory frequency back to quarterly.

holdings is provided in that database starting only in 1980. The CRSP Survivor-Bias Free US Mutual Fund database includes information on US open-end mutual funds starting in 1962. It comprises the name of the fund, monthly net returns, total net assets under management, investment objectives, the names of the fund managers, and further fund-specific information. The CRSP US Stock database provides information about US stocks traded at the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX), and the NASDAQ. It includes information on daily stock prices and returns as well as dividends and market capitalizations for all stocks from 1961 on. We merge all three data sources. Details pertaining to the merging procedure are contained in Appendix A.1.

Our segments are defined by the funds' investment objective categories. We consider funds that belong to the investment objectives "Small Company Growth", "Other Aggressive Growth", "Growth", "Growth and Income", "Income", "Maximum Capital Gains", and "Balanced".[9] We exclude international funds and index funds as well as all bond and money market funds. We further exclude all funds which invest less than 50% in US equities. We do so because the CRSP US Stock database only includes return information on US stocks.[10] Our final sample includes 18,924 yearly observations of mutual fund data starting in 1980. It ends in 2003. Summary statistics of our sample are presented in Table 1.

- Please insert TABLE 1 approximately here -

9 We combine different investment objective classifications (OBJ, ICDI and SI_OBJ) from CRSP to form uniform investment objectives. The procedure resembles the one used by Pastor and Stambaugh (2002).

10 We also do all of our examinations excluding all funds that invest less than 80% and 90%, respectively, in US equities. Our results (not reported) remain qualitatively unaffected by this.

The total number of funds increases from 254 in 1980 to 1,710 in 2001. In 2003, there are 1,226 funds in our sample. From 1980 to 2000 the mean total net assets per fund rise from 181 to 1,464 million USD and then slightly decrease to 1,164 million USD in 2003. The average age of the funds decreases due to the large number of newly founded funds. The average turnover is slightly higher in the more recent years than in the earlier years.

We define all years according to whether we expect compensation or employment incentives to be the main driver of managerial behavior. Our proxy for the relative importance of these two incentives is the stock market return which is calculated as the value-weighted index of all securities that are traded at the NYSE, AMEX, and NASDAQ. Compensation incentives are assumed to be more important if the midyear market return is positive (bull markets) and employment incentives are assumed to be more important if the midyear market return is negative (bear markets), respectively. We use midyear market returns rather than end of year market returns since the fund managers do not know the end of year market return when they decide about changing risk at the middle of the year. Using this procedure, we classify the years 1982, 1984, 1992, 1994, 2000, 2001, and 2002 as those in which employment incentives are more important and all other years as ones in which compensation incentives are more important.[11] Information on midyear and end of year market returns is provided in the last two columns of Table 1. In 19 of 24 years, end of year and midyear market returns

[11] Alternatively, we classify all years in which the excess return of the market over the risk free rate in the middle of the year is positive (negative) as bull (bear) markets. Using this procedure, the years 1981 and 1990 are reclassified as bear markets instead of bull markets. None of our results (not reported) is affected by this.

are of the same signs. Thus, it appears reasonable to assume that fund managers use midyear market returns as a proxy for end of year market returns and eventually the relative importance of employment and compensation incentives, respectively.

2.2. *Construction of the Intended Risk Taking Variable*

While most previous papers analyze the risk taking behavior of mutual fund managers using fund return data (e.g., Brown, Harlow, and Starks, 1996; Koski and Pontiff, 1999; Elton, Gruber, and Blake, 2003), we use information about the portfolio holdings of mutual funds.[12] Analyzing the risk taking behavior of fund managers using portfolio holdings allows us to examine the fund manager's intended rather than the realized change in risk. The intended change in risk is a more exact measure of the fund manager's reaction to the incentives she faces than the realized change in risk. The reason for this is that looking at realized changes in risk does not allow us to distinguish between intended changes in risk and unexpected changes in risk due to changes in the risk of the stocks in the portfolio (Chevalier and Ellison, 1997). Intended risk changes can deviate substantially from realized changes in fund risk because risk changes of stocks affect the change of funds' volatility dramatically (Busse, 2001).

For each fund and year, we compute the intended portfolio risk for the second half of the year, $\sigma_{it}^{(2),\text{int}}$, based on the actual portfolio weights in the second half of the year and the expected stock volatility in the second half of the year. We use the volatility of

12 We are aware of only one other paper which uses holdings data to analyze fund risk, but their measure of risk is different from ours. Chevalier and Ellison (1997) use holdings data to compute the volatility of funds' tracking error.

a stock in the first half of the year as estimator for expected stock volatility in the second half of the year.

To calculate the intended risk change, we have to relate the intended risk in the second half of the year, $\sigma_{it}^{(2),\text{int}}$, to the realized risk in the first half of the year, $\sigma_{it}^{(1)}$. Realized portfolio risk in the first half of the year is calculated using the actual portfolio holdings in the first half of the year and the realized stock volatility in the same period. Details pertaining to the calculation of these risk figures are provided in Appendix A.2.

There are two common approaches to calculate risk changes suggested in the literature: in one, Brown, Harlow, and Starks (1996) capture a fund manager's change in portfolio risk by the risk adjustment ratio.[13] We adopt their idea and define the intended risk adjustment ratio, RAR_{it}, as the intended risk in the second half of the year, $\sigma_{it}^{(2),\text{int}}$, divided by the realized risk in the first half of the year, $\sigma_{it}^{(1)}$:

$$RAR_{it} = \frac{\sigma_{it}^{(2),\text{int}}}{\sigma_{it}^{(1)}}. \qquad (1)$$

Alternatively, Koski and Pontiff (1999) suggest capturing the risk adjustment by the difference in fund risk.[14] We compute the intended risk adjustment as the difference

13 Brown, Harlow, and Starks (1996) do not use holdings data and define the risk adjustment ratio as the ratio of the realized risk in the second part of the year and the realized risk in the first part of the year where both figures are calculated based on return data.

14 Koski and Pontiff (1999) do not use holdings data but calculate risk change based on return data.

between intended portfolio risk in the second half of the year and realized risk in the first half of the year, $\sigma_{it}^{(2),\text{int}} - \sigma_{it}^{(1)}$.

3. Employment and Compensation Incentives as Drivers of Risk Taking

We test whether managerial risk taking behavior depends on the relative importance of compensation and employment incentives (Hypotheses 1 and 2). We use two approaches to analyze the risk taking behavior of fund managers. First, we apply a contingency table approach (Section 3.1). This approach is a very simple non-parametric test of managerial risk taking behavior. Second, we apply a regression approach (Section 3.2). This parametric approach allows us to examine easily Hypothesis 3 on the impact of the strength of the incentives on risk taking (Section 3.3) and to control for the influence of further variables that might be related to risk taking of fund managers (Section 4).

3.1. Contingency Table Approach

According to our Hypothesis 1 (Hypothesis 2), we expect the intended risk adjustment ratio, RAR_{it}, for managers who are midyear losers to be larger (smaller) than that for those who are midyear winners when compensation (employment) incentives dominate. To define a fund manager as a midyear loser, we calculate the rank of this manager's fund *i* in the first half of year *t* as compared to the other funds in the same segment, denoted by $rank_{it}^{(1)}$.[15] Ranks are calculated for each segment and each year separately. They are based on raw returns and are normalized to be equally distributed between zero and one, with the best fund manager in its respective segment getting assigned the rank number one.[16] Managers of funds with a $rank_{it}^{(1)}$ below 0.5 are classified as midyear losers, while managers of funds with a $rank_{it}^{(1)}$ not below 0.5 are classified as midyear winners. To construct 2 x 2 contingency tables, we also classify fund managers as high and low *RAR* fund managers. Managers with a RAR_{it} below the median manager in a given year *t* and segment are classified as low *RAR* managers and managers with a RAR_{it} above the median manager in a given year *t* and segment are classified as high *RAR* managers.

We classify each observation into one of these four cells of the contingency tables and calculate the sample frequency for each cell. We carry out our examination on a subsample consisting of observations from years in which we expect compensation incentives to dominate (compensation incentives subsample) and on a subsample consisting of observations from years in which we expect employment incentives to dominate (employment incentives subsample). Cell frequencies for these subsamples are presented in Panel A of Table 2.

15 Our arguments are made from the view of the incentives a fund manager faces. However, we do our examinations using the fund as unit of observation. Thereby we implicitly equate a fund manager with her fund. However, some manager's manage more than one fund. In these cases, we implicitly assume that fund managers that manage more than one fund manage each fund independently.

16 We use performance ranks based on raw returns rather than the performance itself or the risk-adjusted performance, since fund investors mainly care about ranks in making their investment decisions (e.g., Sirri and Tufano, 1998; Patel, Zeckhauser, and Hendricks, 1994). Consequently, ranks seem the best measure to capture the influence of fund managers' incentives. Furthermore, using normalized ranks has the advantage that fund observations from segments of different sizes are directly comparable.

- Please insert TABLE 2 approximately here -

We find that midyear losers are more likely to increase risk than midyear winners when compensation incentives dominate and vice versa when employment incentives dominate. In the compensation incentives subsample, the frequencies of midyear losers with a high *RAR* and of midyear winners with a low *RAR* are higher than the other cell frequencies. The opposite pattern can be observed in the employment incentives subsample. Based on a χ^2- test we can reject the null hypothesis of identical sample frequencies at the one percent level in both cases. These results support our Hypotheses 1 and 2.[17]

In Panel B we compute the cell frequencies for each individual year in our sample. In 17 of 24 cases, the coefficient is significant and supports our hypothesis. In 6 of the 7 cases in which we find no significant coefficient in the expected direction, the coefficient is insignificant. There is only one case in which the coefficient is significant and in the opposite direction. Overall, these results provide robust support for our Hypotheses 1 and 2: midyear losers have a significantly higher probability of increasing risk than midyear winners if compensation incentives dominate. In contrast, midyear losers have a significantly lower probability of increasing risk than midyear winners if employment incentives are more important.

[17] We find similar results if we populate contingency table cells based on intended risk differences instead of *RAR*s. We report results for the latter, as this allows us to relate our results directly to studies using the contingency table approach like Brown, Harlow, and Starks (1996).

For illustration, in Panel C we also present results for the whole sample. In this case, the null hypothesis of identical cell frequencies cannot be rejected at any reasonable level of significance. Given our findings from above, this result is not surprising. Compensation and employment incentives tend to offset each other in the whole sample. This indicates that not distinguishing between periods in which compensation incentives are more important and periods in which employment incentives are more important can yield misleading results.

3.2. Regression Approach

We now examine the risk taking behavior of fund managers through a regression approach. The advantage of this approach is that the contingency table approach presented above only allows for a distinction between midyear winners and midyear losers. The regression approach allows us to examine the impact of the fund's rank on managerial risk taking in a continuous way. We employ dummy variables to test whether the risk taking of a fund manager depends on the relative strength of compensation incentives and employment incentives. We estimate the following model:

$$\sigma_{it}^{(2),\text{int}} - \sigma_{it}^{(1)} = a + b^{CI} \cdot rank_{it}^{(1)} \cdot D_t^{CI} + b^{EI} \cdot rank_{it}^{(1)} \cdot D_t^{EI} + \varepsilon_{it}. \tag{2}$$

The dependent variable, $\sigma_{it}^{(2),\text{int}} - \sigma_{it}^{(1)}$, is the intended change in fund risk between the first and the second half of year *t*.[18] The explanatory variable in Model (2) is fund *i*'s rank in the first half of year t , $rank_{it}^{(1)}$. The rank coefficient is interacted with the dummy variables D_t^{CI} and D_t^{EI}, respectively. D_t^{CI} (D_t^{EI}) equals one, if compensation incentives (employment incentives) dominate for a given year *t*, and zero otherwise. According to our Hypotheses 1 and 2, we expect midyear losers to increase their risk more than midyear winners when compensation incentives dominate ($b^{CI} < 0$), and vice versa when employment incentives dominate ($b^{EI} > 0$).

Panel A of Table 3 summarizes the estimation results from Model (2). All regressions are estimated with time fixed effects and with panel-corrected standard errors (PCSE) which adjust for potential heteroskedasticity among fund managers' risk adjustments as well as for autocorrelation within each fund manager's risk adjustments (Beck and Katz, 1995).[19]

- Please insert TABLE 3 approximately here -

We find that midyear losers tend to increase risk more than midyear winners when compensation incentives dominate and vice versa when employment incentives dominate. The estimate for b^{CI} is significantly negative, while the estimate for b^{EI} is

18 We find similar results if we use intended *RAR*s instead of the intended risk differences as a dependent variable in our regressions. We report findings for the latter, as this allows us to compare results directly to studies using the regression approach like Koski and Pontiff (1999).

19 Instead of estimating our regressions with PCSE, we estimate our regressions with OLS and conduct Fama and MacBeth (1973) regressions. Results (not reported) are very similar.

significantly positive. These results support our Hypotheses 1 and 2. The size of the estimates indicates that, for example, the best fund managers increase their intended risk by 0.016 points more than the worst fund managers when employment incentives dominate. The average realized risk of funds' portfolios in the first half of the year is 0.152 points. Thus, in this case, the best fund managers intend to increase their risk by 10.5 percent more than the worst fund managers.

In Panel B of Table 3 we present estimation results of the rank coefficients for yearly regressions of a basic version of Model (2):

$$\sigma_{it}^{(2),\text{int}} - \sigma_{it}^{(1)} = a + b \cdot rank_{it}^{(1)} + \varepsilon_{it}. \qquad (3)$$

In 17 out of 24 cases, we find significant estimates in the expected direction: the rank coefficient is significantly negative in bull markets and significantly positive in bear markets, i.e., midyear losers increase risk more than midyear winners if compensation incentives are more important and vice versa if employment incentives are more important. In only one of the cases the coefficient is significant and has a sign of the opposite direction than expected. These results show that our findings are very robust over time.

Our findings are consistent with the results of Brown, Harlow, and Starks (1996). They find no difference pertaining to risk taking between midyear winners and midyear losers for the period from 1980 to 1985, but find more risk taking of midyear losers than of midyear winners for the period from 1986 to 1991. Panel B shows that the number of years in which compensation incentives dominate and in which employment incentives dominate is roughly equal in the first period, while compensation incentives clearly dominate in the second period. This is a possible explanation of the temporal instability of the results on managerial risk taking behavior in Brown, Harlow, and Starks (1996).

Other studies that do not differentiate between periods of strong and weak employment and compensation incentives, respectively, also find contradictory results. Only a few studies address the temporal instability with respect to the influence of the segment rank on risk taking behavior. Kempf and Ruenzi (2008) find that midyear losers increase risk more than midyear winners before 1996, and vice versa from 1997 onwards. This result can also be explained by compensation incentives dominating in the earlier period and employment incentives dominating in the latter period. Similar evidence of unstable risk taking behavior is reported in Jans and Otten (2005) for the U.K. market.

For illustration, in Panel C of Table 3 we also report estimation results of Model (3) for the whole sample. The coefficient on the influence of the rank is virtually zero, when we estimate its impact without distinguishing between periods in which employment incentives and in which compensation incentives, respectively, are more important. It is significant neither in statistical nor in economic terms. This result again confirms that not distinguishing between periods in which employment incentives and in which compensation incentives, respectively, are more important, can easily yield misleading results.

3.3. *Influence of the Strength of the Incentives*

Up to this point, we only classify the years in our sample according to whether we expect compensation or employment incentives to dominate. According to Hypothesis 3, not only the direction but also the strength of the incentives matter. If the market shows a very strong upward movement, compensation incentives for fund managers might be stronger than if the market is only slightly bullish. The very good performance of the market attracts investors' attention and their desire to participate in future gains, while moderately positive returns have less such effect. Thus, the flow-driven effects on a fund manager's compensation described above should be stronger. In addition, higher new inflows lead to higher fee income for the fund family which then can pay higher bonuses to their top-performing fund managers. Thus, we expect the compensation incentives for fund managers to be stronger, the more bullish the market is. A similar argument can be made with respect to the employment incentives being more important for fund managers the more bearish the market is. Thus, we expect a negative relationship between the midyear return of the market as reported in Table 1 and the respective estimated coefficient for the influence of the rank variable as reported in Panel B of Table 3. A graphic illustration of the relationship between those variables is presented in Figure 1.

- Please insert FIGURE 1 approximately here -

The graphic illustration indicates a negative relationship between the midyear return of the market and the estimated coefficient for the rank variable. This suggests that not only the sign of the market return but also its level matters for the strength of risk adjustments. As a more formal test of this relationship, we estimate the following regression:[20]

$$\hat{b}_t = \alpha + \beta \cdot r_t^{Market} + \varepsilon_t, \qquad (4)$$

where we relate the estimated coefficients $\hat{b}_t$ from yearly estimations of Model (3) (see Panel B of Table 3) to the midyear return of the market, r_t^{Market}, for the respective year. We find that the estimate for the impact of r_t^{Market} is -0.097 and is significant at the one percent level (t-value of -5.294). The adjusted R^2 of the regression is 52.80%.

This supports our Hypothesis 3: the more extreme the return of the market, the more pronounced is the impact of the rank on managerial risk taking. These results are consistent with the idea that compensation incentives are the more important, the more bullish the market is, and that employment incentives are the more important, the more bearish the market is.

4. Additional Drivers of Risk Taking

In this section we investigate the impact of additional factors that might influence our main results. Specifically, we examine whether our results are stable if we take into account how fund managers respond to risk surprises (Section 4.1) and if we control

20 We find similar results when running a one-step estimation which combines Models (3) and (4): $\sigma_{it}^{(2),\text{int}} - \sigma_{it}^{(1)} = a + b \cdot rank_{it}^{(1)} + c \cdot rank_{it}^{(1)} \cdot r_t^{Market} + \varepsilon_{it}$.

for the impact of characteristics of the fund, the fund family, and the market segment (Section 4.2). Finally, we test whether the tenure of a fund manager determines how she responds to her interim performance (Section 4.3).

4.1. Impact of Risk Surprises

One important factor likely to influence a fund manager's risk taking behavior is unexpected risk realizations. Fund managers might counterbalance unexpected risk realizations by adjusting their portfolio risk. To examine this conjecture we extend Model (2) by adding the risk surprise in the first half of the year as an explanatory variable. The risk surprise is calculated as the difference between the realized risk in the first half of the year and the intended risk in the first half of the year: $\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}$. As in Section 2.2, intended risk in the first half of the year is calculated using the realized portfolio holdings in the first half of the year, but stock volatilities from the second half of the previous year. The model now reads:

$$\sigma_{it}^{(2),\text{int}} - \sigma_{it}^{(1)} = a + b^{CI} \cdot rank_{it}^{(1)} \cdot D_t^{CI} + b^{EI} \cdot rank_{it}^{(1)} \cdot D_t^{EI} + c \cdot \left(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}} \right) + \varepsilon_{it}. \qquad (5)$$

We expect fund managers to respond to the risk surprise in the first half of the year, $\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}$, by adjusting their risk accordingly in the second half of the year. We expect that a manager reduces risk if the realized risk is higher than intended, i.e., we expect a negative coefficient *c*. This model allows us to examine whether our main result is influenced by the reaction of fund managers to risk surprises. Table 4 summarizes the estimation results of Model (5).

- Please insert TABLE 4 approximately here -

Our results (see Column 2 of Table 4) indicate that fund managers react strongly to risk surprises. We can reject the null hypothesis that unexpected risk has no influence on the intended risk taking behavior at the one percent level. The influence of the risk surprise is negative. This suggests that fund managers counterbalance unexpected risk realizations. However, the significant b^{CI} and b^{EI} coefficients show that our prior findings regarding the opposing influence of employment incentives and compensation incentives on managerial risk taking remain unchanged.

Many fund managers are subject to risk limits (Almazan, Brown, Carlson, and Chapman, 2004). The response to risk surprises might be triggered by the fund manager's obligation to adhere to such limits. As risk limits are typically upper limits, we expect differences in the impact of risk surprises depending on whether there are positive or negative deviations of realized risk from intended risk. We expect that fund managers have to decrease their portfolio risk if realized risk in the first part of the year is larger than intended risk so as to stay within their risk limits for the year. In contrast, if they face a negative risk surprise, there might be no urgent need to adjust risk. Thus, positive risk surprises should have a stronger effect on subsequent risk adjustments than negative ones. To capture this difference, we interact the risk surprise, $\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}$, with the dummy variable, D_{it}^{pos}, that equals one if the risk surprise is positive, and zero otherwise. The complete model then reads:

$$\begin{aligned}\sigma_{it}^{(2),\text{int}} - \sigma_{it}^{(1)} &= a + b^{CI} \cdot rank_{it}^{(1)} \cdot D_{t}^{CI} + b^{EI} \cdot rank_{it}^{(1)} \cdot D_{t}^{EI} \\ &\quad + c \cdot \left(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}\right) + c^{pos} \cdot \left(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}\right) \cdot D_{it}^{pos} + \varepsilon_{it}.\end{aligned} \tag{6}$$

The coefficient c^{pos} captures the additional impact if the risk surprise is positive compared to the base case of a negative risk surprise. Estimation results are presented in the last column of Table 4.

We find that fund managers only counterbalance risk surprises if they face a higher than expected risk realization; they do not react upon surprisingly low risk realizations. This suggests that risk limits play an important role in determining risk changing behavior of fund managers. Still, our main results are not affected by taking these effects into account.

4.2. *Impact of Fund Characteristics*

We now analyze whether our findings are robust with regard to the influence of other fund characteristics that might influence the behavior of the fund manager. We conduct a multivariate analysis of managerial risk taking,[21] where we extend Model

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[21] Alternatively, we also estimate Model (6) for subsamples of funds with specific characteristics. Subsamples are formed based on whether the size, age, turnover, or expenses are above or below the median values of the whole sample, and according to their load-status, the numbers of share classes they offer, and to the investment objective they belong to. Generally, our

(6) by adding fund characteristics, some further control variables, and various kinds of fixed and random effects:

$$\begin{aligned}\sigma_{it}^{(2),\text{int}} - \sigma_{it}^{(1)} = a + b^{CI} \cdot rank_{it}^{(1)} \cdot D_t^{CI} + b^{EI} \cdot rank_{it}^{(1)} \cdot D_t^{EI} + c \cdot \left(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}\right) \\ + c^{pos} \cdot \left(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}\right) \cdot D_{it}^{pos} + d \cdot \ln(tna)_{it} + e \cdot \ln(age)_{it} \\ + f \cdot D_{it}^{load} + g \cdot expenses_{it} + h \cdot turnover_{it} + i \cdot D_{it}^{shareclass} \\ + j \cdot \left(\tilde{\sigma}_{it}^{(2),\text{int}} - \tilde{\sigma}_{it}^{(1)}\right) + k \cdot \left(\sigma_{it}^{(1)}\right) + \varepsilon_{it},\end{aligned} \tag{7}$$

where $\ln(tna)_{it}$ and $\ln(age)_{it}$ are the natural logarithm of fund total net assets and fund age, respectively, D_{it}^{load} is a dummy that takes on the value one if fund *i* is a load fund, and zero otherwise, $expenses_{it}$ and $turnover_{it}$ are the expense ratio and the turnover ratio of fund *i*, respectively, and $D_{it}^{shareclass}$ is a dummy that takes on the value one if the fund is a multiple-share class fund, and zero otherwise. Since previous studies (e.g., Daniel and Wermers, 2000; Kempf and Ruenzi, 2008) find a strong influence of the realized risk in the first half of the year and the median of the risk changes of all funds in the same segment on managerial risk taking, we add additional explanatory variables in our regression. $\tilde{\sigma}_t^{(2),\text{int}} - \tilde{\sigma}_t^{(1)}$ is the intended risk change of the manager of the median fund in the segment the fund belongs to, and $\sigma_{it}^{(1)}$ is the realized risk of the fund in the first part of the year. Estimation results of Model (7) are summarized in Table 5.

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results (not reported) show only minor variations in the level of the rank coefficients. All rank coefficients are of the expected sign and remain significant at the one percent level. Results are robust independent of the subgroup considered. Our results concerning the influence of the risk surprise are also stable with respect to different fund characteristics.

- Please insert TABLE 5 approximately here -

Our main results remain unaffected by including these additional control variables: midyear losers increase risk more than midyear winners when compensation incentives dominate. When employment incentives dominate, the opposite behavior occurs. Most of the control variables have insignificant coefficients. Size and turnover have a statistically significant but economically small influence on fund managers' risk taking. The influence of risk in the first half of the year is significantly negative. This indicates mean reversion in fund risk and confirms the findings of Koski and Pontiff (1999) and Daniel and Wermers (2000). The influence of the median of the intended risk changes of all funds in the same segment is significantly positive which agrees with the findings of Kempf and Ruenzi (2008).

To control for differences between the various segments and families that fund managers belong to, we also estimate Model (7) with segment fixed effects (see Column 3 of Table 5) and with segment and family fixed effects (see Column 4 of Table 5), respectively. Adding segment fixed effects and family fixed effects changes none of our main results.[22] Instead of including family fixed effects, we also estimate the model with individual random effects (see Column 5 of Table 5). Still, our main results remain unaffected.

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[22] As we only have data on fund families from 1992 on, our sample is limited to the years 1992 to 2003 if we estimate our model with family fixed effects. This limitation significantly reduces our sample size from 18,924 observations to 14,239 observations.

4.3. *Impact of Manager Tenure*

We now turn to the question of whether the reaction of a fund manager on her midyear performance depends on her tenure. The sensitivity to employment and compensation incentives might vary during the life-cycle of a fund manager. For example, fund managers with a very high tenure might be less concerned about losing their job than managers with a low tenure because they have built up a reputation and are close to retirement anyhow (Chevalier and Ellison, 1999). Regarding compensation incentives, older managers might also be less concerned about earning another bonus payment as their personal wealth is probably already relatively high.

To examine whether these potential differences have any impact on fund managers' response to their midyear performance, we make the coefficients b^{CI} and b^{EI} in Model (7) dependent upon the tenure of the fund manager. We interact the impact of interim performance on risk changes with a high tenure dummy variable, D_{it}^{HT} . This variable takes on the value one, if the tenure of a fund manager is above the median tenure of all fund managers, and zero otherwise. The tenure of a fund manager is calculated based on the manager's entrance into the fund industry.[23] Our model now reads:

[23] As we only have data on fund manager names from 1992 on, our sample is limited to the years 1992 to 2003 in this case. Furthermore, we limit our sample to single-managed funds for this examination, as we cannot identify individual managers for most teams. This limitation significantly reduces our sample size from 14,239 observations to 7,521 observations.

$$
\begin{aligned}
\sigma_{it}^{(2),\text{int}} - \sigma_{it}^{(1)} = {} & a + b_0^{CI} \cdot rank_{it}^{(1)} \cdot D_t^{CI} + b_1^{CI} \cdot rank_{it}^{(1)} \cdot D_t^{CI} \cdot D_{it}^{HT} \\
& + b_0^{EI} \cdot rank_{it}^{(1)} \cdot D_t^{EI} + b_1^{EI} \cdot rank_{it}^{(1)} \cdot D_t^{EI} \cdot D_{it}^{HT} \\
& + c \cdot \left(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}} \right) + c^{pos} \cdot \left(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}} \right) \cdot D_{it}^{pos} \\
& + d \cdot \ln(tna)_{it} + e \cdot \ln(age)_{it} + f \cdot D_{it}^{load} + g \cdot expenses_{it} \\
& + h \cdot turnover_{it} + i \cdot D_{it}^{shareclass} + j \cdot \left(\tilde{\sigma}_{it}^{(2),\text{int}} - \tilde{\sigma}_{it}^{(1)} \right) + k \cdot \left(\sigma_{it}^{(1)} \right) \\
& + l \cdot tenure_{it} + \varepsilon_{it}.
\end{aligned} \qquad (8)
$$

In addition to the control variables in the previous model, we also include the tenure of the fund's manager, $tenure_{it}$, as additional explanatory variable. Alternatively, we also estimate a modified version of Model (8), where we replace the high tenure dummy variable with $tenure_{it}$. Estimation results for both models are presented in Table 6.

- Please insert TABLE 6 approximately here -

In general, we still find the expected negative influence of the midyear performance if the manager's compensation incentives dominate and the expected positive influence if employment incentives dominate. The coefficient on the interaction term with the high tenure dummy in Columns 1, 3, 5, and 7 is significantly positive when the compensation incentives dominate, i.e., managers with high tenure respond less to compensation incentives. For example, the estimate of 0.004 in Column 3 indicates that managers with high tenure respond only half as strongly to compensation incentives as compared to managers with shorter tenure. This result is consistent with theoretical arguments that older managers are harder to incentivize than younger managers because they are less responsive to performance based incentives (Gibbons and Murphy, 1992).[24] The finding of a weaker reaction upon compensation incentives is also confirmed if we look at the results in Columns 2, 4, 6, and 8 for the interaction with $tenure_{it}$, where we also find a significantly positive impact.

Turning to differences with respect to employment incentives, we find no significant results using either the interaction with the high tenure dummy or the interaction with $tenure_{it}$. Regardless of their tenure, managers seem to react similarly upon employment incentives. This result is consistent with the idea that even older managers still care about keeping their jobs.

5. Conclusion

Mutual fund managers face various incentives that have an impact on their risk taking. While compensation incentives arising from the convex performance flow relationship are studied in great detail (e.g., Brown, Harlow, and Starks, 1996; Koski and Pontiff, 1999; Elton, Gruber, and Blake, 2003), there is little evidence on the impact of employment risk on the risk taking decisions of mutual fund managers. In this paper, we jointly examine compensation incentives and employment incentives.

Using data on portfolio holdings of US equity mutual funds and stock returns from 1980 to 2003, we find that the way fund managers alter their risk in response to their

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24 This effect could be counterbalanced if compensation contracts of older managers have a higher incentive component than those of younger managers. However, evidence in Farnsworth and Taylor (2006) suggests that the performance dependent component of fund manager compensation does not vary significantly between young and old managers.

midyear performance depends on the relative strength of their employment and compensation incentives. Our findings indicate that midyear losers increase their risk more than midyear winners in bull markets where compensation incentives would be more important. The opposite holds in bear markets, where employment incentives would dominate. These results reconcile contradictory results presented in earlier studies.

Our results are neither driven by characteristics of the fund, the fund family, the market segment, or the fund manager nor by the reaction of managers to unexpected risk realization. We find that managers counterbalance risk surprises only if realized risk is higher than initially planned. This is consistent with the idea that fund managers face risk limits they must not or do not want to exceed by the end of the year. However, our main results are not affected by this response to risk surprises.

Gaining a better understanding of the incentives driving fund managers' behavior is important for fund investors and fund companies, as these incentives can lead to adverse managerial behavior. As Brown, Harlow, and Starks (1996) point out, risk adjustment of fund managers as a response to compensation incentives may not be optimal for fund investors. The same is true for risk adjustments due to employment incentives. They are not aimed at building a portfolio with optimal risk-return characteristics from the fund investor's point of view and can create additional trading costs, which eventually hurts performance (Bagnoli and Watts, 2000; Li and Tiwari, 2006; Huang, Sialm, and Zhang, 2008). James and Isaac (2000) show that risk changes due to such incentives can even lead to inefficient price formation in asset markets and might thus be of some interest from a regulatory point of view.

Perhaps the most important implication of our study for future research on managerial risk taking is that temporal variations of compensation and employment incentives should not be neglected. Our findings suggest that ignoring such variations can easily deliver misleading results and eventually lead to erroneous conclusions. We think that our results not only hold for managers of mutual funds, but also might have important implications for the behavior of managers of corporations in general. In the corporate world the business cycle might play a role similar to the role played by bull and bear markets in the mutual fund industry. For example, it is likely that employment risk is only a minor concern for managers in a boom period, while it might seriously impact their decisions in a recession. We think that analyzing the impact of business cycles on the incentives corporate managers face offers an interesting avenue for future research.

Appendix

A.1. Matching Process

We start our merging procedure by matching the stocks from the CRSP US Stock database with the holdings data from the Thomson Financial database based on the stocks' CUSIP identifier. To match the holdings data from Thomson Financial and the mutual fund data from CRSP we first aggregate multiple share classes of the same fund in the CRSP data as in Wermers (2000). Then, the aggregated CRSP fund data are matched with the Thomson Financial fund data. There is no unique common identifier used in both databases for the whole time period. Only since 1999 have both CRSP and Thomson Financial provided ticker data. Therefore, we initially match the databases using ticker data for the years 1999 to 2003 and extrapolate the match for the prior years. The procedure is similar to the one used by Gaspar, Massa, and Matos (2006). Beginning in 1980, we then consider the funds' names for our matching process. An algorithm which identifies identical strings and abbreviations is applied. This is necessary, because the CRSP database comprises a 50-character text field for the funds' names, while Thomson Financial provides a 25-character text field. Finally, we check the validity of this matching procedure by comparing total net assets and investment objective information from both data sources for the matched funds.

A.2. Calculation of Intended and Realized Risk

Information about the portfolio holdings is available quarterly or semi-annually. We assume that fund managers change their holdings only once between the report dates. For the remaining time, we assume that the number of shares held by the fund remains constant. Portfolio holdings are adjusted for stock splits. We first compute the realized risk of the funds' portfolios in the first half of the year, $\sigma_{it}^{(1)}$, based on 26 weekly portfolio returns.

To compute the intended risk of the funds' portfolio in the second half of the year, $\sigma_{it}^{(2),\text{int}}$, we calculate 26 hypothetical portfolio returns based on holdings information from the second half of the year and on stock returns from the first half of the year. This gives us a weekly portfolio return time series. $\sigma_{it}^{(2),\text{int}}$ is defined as the volatility of this portfolio return time series. Using the same method as above, we also compute the intended risk in the first half of the year, $\sigma_{it}^{(1),\text{int}}$.

References

Agarwal, V., Naik, N.V., 2004. Risks and portfolio decisions involving hedge funds. Review of Financial Studies 17, 63–98.

Almazan, A., Brown, K.C., Carlson, M., Chapman, D.A., 2004. Why constrain your mutual fund manager? Journal of Financial Economics 73, 289–321.

Bagnoli, M., Watts, S.G., 2000. Chasing hot funds: the effects of relative performance on portfolio choice. Financial Management 29, 31–50.

Beck, N., Katz, J.N., 1995. What to do (and not to do) with time-series cross-section data. American Political Science Review 89, 634–647.

Bloom, M., Milkovich, G.T., 1998. Relationships among risk, incentive pay and organizational performance. Academy of Management Journal 43, 283–297.

Breuer, W., Stotz, O., 2007, Mutual Fund Flows and Extrapolative Investors' Expectations: The German Case. Unpublished working paper, RWTH Aachen University.

Brown, K.C., Harlow, W., Starks, L.T., 1996. Of tournaments and temptations: an analysis of managerial incentives in the mutual fund industry. Journal of Finance 51, 85–110.

Busse, J.A., 2001. Another look at mutual fund tournaments. Journal of Financial and Quantitative Analysis 36, 53–73.

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

Carpenter, J.N., 2000. Does option compensation increase managerial risk appetite? Journal of Finance 55, 2311–2331.

Chakraborty, A., Sheikh, S., Subramanian, N., 2007. Termination risk and managerial risk taking. Journal of Corporate Finance 13, 170-188.

Chevalier, J., Ellison, G., 1997. Risk taking by mutual funds as a response to incentives. Journal of Political Economy 105, 1167–1200.

Chevalier, J., Ellison, G., 1999. Career concerns of mutual fund managers. Quarterly Journal of Economics 114, 389–432.

Clarke, J., Subramanian, A., 2006. Dynamic forecasting behavior by analysts: theory and evidence. Journal of Financial Economics 80, 81-113.

Cohen, R.B., Hall, B.J., Viceira, L.M., 2000. Do executive stock options encourage risk-taking? Unpublished working paper, Harvard University, Boston.

Coles, J.L., Daniel, N.D., Naveen, L., 2006. Executive compensation and managerial risk-taking. Journal of Financial Economics 79, 431–468.

Coughlan, A., Anne, T., Schmidt, R., 1985. Executive compensation, managerial turnover and firm performance: an empirical investigation. Journal of Accounting & Economics 7, 43–66.

Daniel, N.D., Wermers, R., 2000. Risk taking behavior by mutual fund managers: do managers 'walk away' from the tournament? Unpublished working paper, Georgia State University.

Elton, E.J., Gruber, M.J., Blake, C.R., 2003. Incentive fees and mutual funds. Journal of Finance 58, 779–804.

Faff, R.W., Parwada, J. T., Yang, J. W., 2006, Fund managers' institutional background and the birth of investment management companies. Unpublished working paper, Monash University.

Fama E., MacBeth, J., 1973. Risk, return, and equilibrium: empirical tests. Journal of Political Economy 81, 607–636.

Farnsworth, H., Taylor, J., 2006. Evidence on the compensation of portfolio managers. Journal of Financial Research 29, 305–324.

Gaspar, J. M., Massa, M., Matos, P., 2006. Favoritism in mutual fund families? Evidence on strategic cross-fund subsidization. Journal of Finance 61, 73–104.

Gibbons, R., Murphy, K.J., 1992. Optimal incentive contracts in the presence of career concerns. Journal of Political Economy 100, 468-505.

Gilson, S.C., 1989. Management turnover and financial distress. Journal of Financial Economics 25, 241–262.

Golec, G., Starks, L.T., 2004. Performance fee contract change and mutual fund risk. Journal of Financial Economics 73, 98–118.

Hong, H., Kubik, J.D., 2003. Analyzing the analysts: career concerns and biased earning forecasts. Journal of Finance 58, 313–351.

Hu, F., Hall, A.R., Harvey, C.R., 2000. Promotion or demotion? An empirical investigation of the determinants of top mutual fund manager change. Unpublished working paper, Duke University.

Hu, P., Kale, J.R., Pagani, M., Subramaniam, A., 2008. Fund flows, performance, managerial career concerns, and risk-taking. Unpublished working paper, Georgia State University.

Huang, J., Sialm, C., Zhang, H., 2008. Risk shifting and mutual fund performance. Unpublished working paper. University of Texas at Austin.

Jacobson, L.S., LaLonde, R.J., Sullivan, D.G., 1993. Earnings losses of displaced workers. American Economic Review 83, 685-709.

James, D., Isaac, R.M., 2000. Asset markets: How they are affected by tournament incentives for individuals. American Economic Review 90, 995–1004.

Jans, R., Otten, R., 2005. Tournaments in the UK mutual fund industry. Managerial Finance, forthcoming.

Karceski, J., 2002, Returns-chasing behavior, mutual funds, and Beta's death. Journal of Financial and Quantitative Analysis 37, 559–594.

Kempf, A., Ruenzi, S., 2008. Tournaments in mutual fund families. Review of Financial Studies 21, 1013-1036.

Khorana, A., 1996. Top management turnover: an empirical investigation of mutual fund managers. Journal of Financial Economics 40, 403–427.

Koski, J.L., Pontiff, J., 1999. How are derivatives used? Evidence from the mutual fund industry. Journal of Finance 54, 791–816.

Krebs, T., 2007. Job displacement risk and the cost of business cycles. American Economic Review 93, 664-686.

Li, W., and A. Tiwari, 2006. On the consequences of mutual fund tournaments. Unpublished working paper, University of Iowa.

Murphy, K., Zimmerman, J., 1993. Financial performance surrounding CEO turnover. Journal of Accounting and Economics 16, 273–315.

Pastor, L., Stambaugh, R.F., 2002. Mutual fund performance and seemingly unrelated assets. Journal of Financial Economics 63, 315–349.

Patel, J., Zeckhauser, R.J., Hendricks, D., 1994. Investment flows and performance: evidence from mutual funds, cross-border investments, and new issues. In: Sato, R., Levich, R.M., Ramachandran, R.V. (Eds.), Japan, Europe, and International Financial Markets: Analytical and empirical perspectives, Cambridge University Press, Cambridge, UK, 51–72.

Rajgopal, S., Shevlin, T., 2002. Empirical evidence on the relation between stock option compensation and risk-taking. Journal of Accounting and Economics 33, 145–171.

Sirri, E.R., Tufano, P., 1998. Costly search and mutual fund flows. Journal of Finance 53, 1589–1622.

Qui, J., 2003. Termination risk, multiple managers and mutual fund tournaments. European Finance Review 7, 161–190.

Wermers, R., 2000. Mutual fund performance: An empirical decomposition into stock-picking talent, style, transactions costs, and expenses. Journal of Finance 55, 581–622.

Zhao, X., 2005a. Entry Decisions by Mutual Fund Families. In: Kline, E. (Eds.), Stock Exchanges, IPO's and Mutual Funds, Nova Science Publishers, Inc., New York, 151-179.

Zhao, X., 2005b. Exit decisions in the U.S. mutual fund industry. Journal of Business 78, 1365–1401.

Figure 1

Relationship between the Rank Coefficient and the Midyear Market Return

We plot the midyear market returns as well as the coefficient $\hat{b}_t$ of the different years from Model (3):

$$\sigma_{it}^{(2),\text{int}} - \sigma_{it}^{(1)} = a + b_t \cdot rank_{it}^{(1)} + \varepsilon_{it} \,. \qquad (3)$$

The return observations are taken from Column 6 of Table 1 and the coefficients $\hat{b}_t$ from Column 2 of Panel B of Table 3. The observations are sorted in ascending order based on the midyear return of the market.

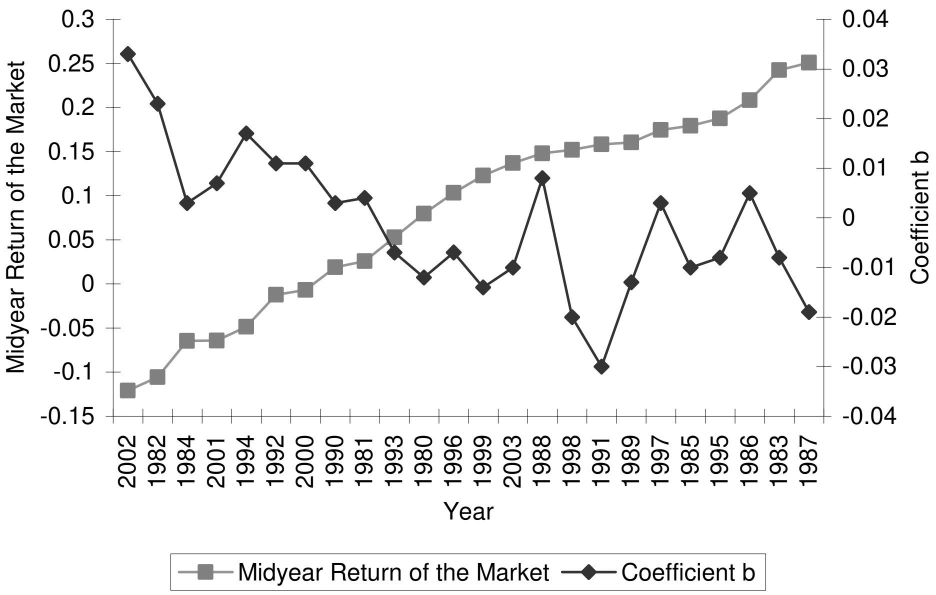

Table 1

Summary Statistics

This table reports the summary statistics of the sample funds for the period from 1980 to 2003. The sample consists of all actively managed US equity funds which hold more than 50% in US equities. It contains observations from our merge of the CRSP US Stock database with the Thomson Financial Mutual Fund Holdings database and the CRSP Survivor-Bias Free US Mutual Fund database. For each sample year, it provides fund counts, average age, the mean total net assets (TNA), and the mean turnover ratio of the funds. In the last two columns, the table reports the midyear return and the end of year return of the value-weighted index for all securities traded at the NYSE, AMEX and NASDAQ (market return).

Year	Number of Funds	Average Age (in Years)	Mean TNA (in Mio. USD)	Mean Turnover (in %)	Midyear Return of the Market (in %)	End of Year Return of the Market (in %)
1980	254	24	181	71.45	7.96	32.01
1981	241	25	163	66.21	2.60	-3.04
1982	260	26	186	76.29	-10.57	19.89
1983	272	26	249	78.22	24.24	21.68
1984	297	24	234	73,55	-6.44	2.98
1985	322	24	297	82.86	17.92	31.11
1986	354	23	341	83.58	20.84	15.92
1987	408	21	357	93.95	25.08	1.99
1988	471	19	326	78.09	14.80	17.47
1989	520	19	392	73.32	16.05	28.53
1990	462	20	387	83.06	1.90	-6.07
1991	558	19	482	n.a.	15.82	33.79
1992	614	18	540	74.62	-1.21	8.79
1993	671	17	650	76.75	5.30	11.92
1994	909	13	538	76.82	-4.85	-0.83
1995	1,081	13	713	87.68	18.77	35.03
1996	1,126	13	904	91.57	10.32	21.21
1997	1,295	13	1,129	87.29	17.45	30.30
1998	1,461	12	1,184	89.26	15.20	22.01
1999	1,552	12	1,399	92.98	12.29	26.55
2000	1,367	12	1,464	88.28	-0.68	-11.18
2001	1,710	12	1,146	106.16	-6.41	-11.33
2002	1,493	12	841	103.46	-12.10	-20.93
2003	1,226	13	1,164	94.58	13.70	33.35
Total	18,924	15	871	88.25	8.25	14.21

Table 2

Intended Risk Taking and Employment and Compensation Incentives: Contingency Table Approach

This table reports the frequency of fund managers allocated to each of four cells in a 2 x 2 contingency table. The cells refer to different combinations of fund managers that are midyear winners/midyear losers based on the funds' rank in the first half of the year and of funds with a risk adjustment ratio (*RAR*) below/above the median fund in the first half of the year. The risk adjustment ratio is defined as:

$$RAR_{it} = \frac{\sigma_{it}^{(2),\text{int}}}{\sigma_{it}^{(1)}}. \tag{1}$$

$\sigma_{it}^{(2),\text{int}}$ is the intended risk of the fund manager in the second half of year *t*. $\sigma_{it}^{(1)}$ is the realized risk in the first half of year *t*. The null hypothesis for the χ^2-tests is that the percentage in each cell is 25% which means that the status of a fund manager as midyear winner/midyear loser has no influence on RAR. The p-value is based on the standard χ^2-test. Panel A shows the results for subsamples of years in which we expect compensation incentives to dominate and in which we expect employment incentives to dominate. Panel B shows the same results separately for each year from 1980 to 2003 and Panel C for the whole sample. In all Panels, ***, **, and * indicate significance at the one, five, and ten percent level, respectively.

Panel A: Compensation Incentive Subsample vs. Employment Incentive Subsample

		Sample Frequency (Percent of observations)				
Dominating Incentive		Midyear Winner	Midyear Loser	χ^2	p-value	Obser-vations
Compensation	High RAR	22.24	27.60	133.30 ***	0.000	12,274
	Low RAR	27.60	22.55			

		Sample Frequency (Percent of observations)				
Dominating Incentive		Midyear Winner	Midyear Loser	χ^2	p-value	Obser-vations
Employment	High RAR	29.02	20.80	188.13 ***	0.000	6,650
	Low RAR	20.80	29.38			

Table 2

(continued)

Panel B: Yearly Observations

Year	Sample Frequency (Percent of observations): Midyear Winner, High RAR	Midyear Winner, Low RAR	Midyear Loser, High RAR	Midyear Loser, Low RAR	χ^2	p-value	Obser-vations	Dominating Incentive
1980	24.41	24.80	24.80	25.98	0.14	0.707	254	Compensation
1981	25.73	24.07	24.07	26.14	0.34	0.557	241	Compensation
1982	27.69	21.92	21.92	28.46	3.97 **	0.046	260	Employment
1983	24.26	25.37	25.37	25.00	0.09	0.766	272	Compensation
1984	27.27	22.22	22.22	28.28	3.73 *	0.054	297	Employment
1985	21.43	28.57	28.57	21.43	6.57 **	0.010	322	Compensation
1986	24.58	25.14	25.14	25.14	0.03	0.854	354	Compensation
1987	19.36	30.39	30.39	19.85	19.0 ***	0.000	408	Compensation
1988	27.18	22.72	22.72	27.39	3.93 **	0.047	471	Compensation
1989	20.77	29.23	29.23	20.77	14.89 ***	0.000	520	Compensation
1990	24.03	25.76	25.76	24.46	0.44	0.506	462	Compensation
1991	16.85	32.97	32.97	17.20	56.80 ***	0.000	558	Compensation
1992	26.38	23.29	23.29	27.04	2.93 *	0.087	614	Employment
1993	20.27	29.36	29.36	21.01	20.48 ***	0.000	671	Compensation
1994	28.27	21.45	21.45	28.82	18.36 ***	0.000	909	Employment
1995	21.74	28.12	28.12	22.02	16.88 ***	0.000	1,081	Compensation
1996	23.36	26.47	26.47	23.71	3.90 **	0.048	1,126	Compensation
1997	24.09	25.79	25.79	24.32	1.31	0.252	1,295	Compensation
1998	19.71	30.25	30.25	19.78	64.51 ***	0.000	1,461	Compensation
1999	22.74	27.13	27.13	23.00	11.25 ***	0.001	1,552	Compensation
2000	27.65	22.24	22.24	27.87	16.69 ***	0.000	1,367	Employment
2001	28.01	21.87	21.87	28.25	26.80 ***	0.000	1,710	Employment
2002	33.56	16.34	16.34	33.76	179.04 ***	0.000	1,493	Employment
2003	22.59	27.32	27.32	22.76	10.61 ***	0.001	1,226	Compensation

Panel C: Whole Sample

		Sample Frequency (Percent of observations): Midyear Winner	Midyear Loser	χ^2	p-value	Obser-vations
Whole Sample	High RAR	24.62	25.21	1.759	0.624	18,924
	Low RAR	25.21	24.95			

Table 3

Intended Risk Taking and Employment and Compensation Incentives: Regression Approach

Panel A of Table 3 presents the coefficients of the following regression estimated with time fixed effects and with panel-corrected standard errors (PCSE):

$$\sigma_{it}^{(2),\text{int}} - \sigma_{it}^{(1)} = a + b^{CI} \cdot rank_{it}^{(1)} \cdot D_t^{CI} + b^{EI} \cdot rank_{it}^{(1)} \cdot D_t^{EI} + \varepsilon_{it}. \qquad (2)$$

Panel B and Panel C of this table contain the coefficients of the following basis version of this regression estimated separately for each year 1980 to 2003 and for the whole sample, respectively:

$$\sigma_{it}^{(2),\text{int}} - \sigma_{it}^{(1)} = a + b \cdot rank_{it}^{(1)} + \varepsilon_{it}. \qquad (3)$$

In these models, $rank_{it}^{(1)}$ is the rank of fund *i* in its segment based on raw returns in the first half of year *t*. In Model (2), D_t^{CI} (D_t^{EI}) is a dummy variable which is equal to one, if the compensation incentives (employment incentives) are more important, and zero otherwise. $\sigma_{it}^{(2),\text{int}}$ is the intended risk of the fund manager in the second half of year *t*. $\sigma_{it}^{(1)}$ is the realized risk in the first half of year *t*. In Panel A and C, the last two rows, and in Panel B the third and fourth columns present the adjusted R^2 and the number of observations. ***, **, and * indicate significance at the one, five, and ten percent level, respectively. In Panel A and C t-values are reported in parentheses.

Panel A: Full Sample, Model (2)

Independent Variable	
$rank_{it} \cdot D_t^{CI}$	-0.009 *** (-9.901)
$rank_{it} \cdot D_t^{EI}$	0.016 *** (11.281)
Adj. R^2	0.140
Observations	18,924

Table 3

(continued)

Panel B: Yearly Regressions, Model (3)

Year	$rank_{it}$	Adj. R^2	Observations	Dominating Incentive
1980	-0.012 *	0.011	254	Compensation
1981	0.004	-0.001	241	Compensation
1982	0.023 ***	0.105	260	Employment
1983	-0.008 *	0.011	272	Compensation
1984	0.003	-0.002	297	Employment
1985	-0.010 ***	0.025	322	Compensation
1986	0.005	0.004	354	Compensation
1987	-0.019 ***	0.055	408	Compensation
1988	0.008 ***	0.017	471	Compensation
1989	-0.013 ***	0.070	520	Compensation
1990	0.003	0.000	462	Compensation
1991	-0.030 ***	0.124	558	Compensation
1992	0.011 ***	0.037	614	Employment
1993	-0.007 ***	0.021	671	Compensation
1994	0.017 ***	0.073	909	Employment
1995	-0.008 ***	0.029	1,081	Compensation
1996	-0.007 ***	0.009	1,126	Compensation
1997	0.003	0.001	1,295	Compensation
1998	-0.020 ***	0.040	1,461	Compensation
1999	-0.014 ***	0.014	1,552	Compensation
2000	0.011 **	0.003	1,367	Employment
2001	0.007	0.001	1,710	Employment
2002	0.033 ***	0.094	1,493	Employment
2003	-0.010 ***	0.012	1,226	Compensation

Panel C: Full Sample, Model (3)

Independent Variable	
$rank_{it}$	-0.000 (-.521)
Adj. R^2	0.127
Observations	18,924

Table 4

Impact of Risk Surprises

This table presents the coefficients of the following regressions estimated with time fixed effects and with panel-corrected standard errors (PCSE):

$$\sigma_{it}^{(2),\text{int}} - \sigma_{it}^{(1)} = a + b^{CI} \cdot rank_{it}^{(1)} \cdot D_t^{CI} + b^{EI} \cdot rank_{it}^{(1)} \cdot D_t^{EI} + c \cdot \left(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}} \right) + \varepsilon_{it} \tag{5}$$

$$\sigma_{it}^{(2),\text{int}} - \sigma_{it}^{(1)} = a + b^{CI} \cdot rank_{it}^{(1)} \cdot D_t^{CI} + b^{EI} \cdot rank_{it}^{(1)} \cdot D_t^{EI} + c \cdot \left(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}} \right) + c^{pos} \cdot \left(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}} \right) \cdot D_{it}^{pos} + \varepsilon_{it}. \tag{6}$$

In these models, $rank_{it}^{(1)}$ is the rank of fund *i* in its segment based on raw returns in the first half of year *t*. D_t^{CI} (D_t^{EI}) is a dummy variable which is equal to one if the compensation incentives (employment incentives) are more important, and zero otherwise. $\sigma_{it}^{(2),\text{int}}$ is the intended risk of the fund manager in the second half of year *t*. $\sigma_{it}^{(1)}$ is the realized risk in the first half of year *t*. $\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}$ is the risk surprise in the first half of the year. D_{it}^{pos} is a dummy variable which is equal to one if $\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}$ is positive, and zero otherwise. The last two rows present the adjusted R^2 and the number of observations. ***, **, and * indicate significance at the one, five, and ten percent level, respectively. t-values are reported in parentheses.

Independent Variable	Model (5)	Model (6)
$rank_{it} \cdot D_t^{CI}$	-0.008 ***	-0.008 ***
	(-9.039)	(-9.008)
$rank_{it} \cdot D_t^{EI}$	0.017 ***	0.018 ***
	(12.247)	(12.328)
$\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}$	-0.054 ***	0.000
	(-6.968)	(-.052)
$\left(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}} \right) \cdot D_{it}^{pos}$		-0.135 ***
		(-8.162)
Adj. R^2	0.144	0.150
Observations	18,924	18,924

Table 5

Impact of Fund, Fund Family, and Segment Characteristics

This table presents the coefficients of the following regression estimated with time fixed effects, panel-corrected standard errors (PCSE) and different combinations of segment fixed, family fixed, and individual random effects:

$$\begin{aligned}\sigma_{it}^{(2),\text{int}} - \sigma_{it}^{(1)} = {} & a + b^{CI} \cdot rank_{it}^{(1)} \cdot D_t^{CI} + b^{EI} \cdot rank_{it}^{(1)} \cdot D_t^{EI} + c \cdot \left(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}\right) \\ & + c^{pos} \cdot \left(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}\right) \cdot D_{it}^{pos} + d \cdot \ln(tna)_{it} + e \cdot \ln(age)_{it} \\ & + f \cdot D_{it}^{load} + g \cdot expenses_{it} + h \cdot turnover_{it} + i \cdot D_{it}^{shareclass} \\ & + j \cdot \left(\tilde{\sigma}_{it}^{(2),\text{int}} - \tilde{\sigma}_{it}^{(1)}\right) + k \cdot \left(\sigma_{it}^{(1)}\right) + \varepsilon_{it},\end{aligned} \tag{7}$$

In this model, $rank_{it}^{(1)}$ is the rank of fund *i* in its segment based on raw returns in the first half of year *t*. D_t^{CI} (D_t^{EI}) is a dummy variable which is equal to one if the compensation incentives (employment incentives) are more important, and zero otherwise. $\sigma_{it}^{(2),\text{int}}$ is the intended risk of the fund manager in the second half of year *t*. $\sigma_{it}^{(1)}$ is the realized risk in the first half of year *t*. $\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}$ is the risk surprise in the first half of the year. D_{it}^{pos} is a dummy variable which is equal to one, if $\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}$ is positive, and zero otherwise. $\ln(tna)_{it}$ and $\ln(age)_{it}$ are the natural logarithm of fund total net assets and fund age, respectively, D_{it}^{load} is a dummy indicating the load status of fund *i* which takes on the value one if any of the share classes of the fund charges a load, and zero otherwise, $expenses_{it}$ and $turnover_{it}$ are the expense ratio and the turnover ratio of fund *i*, respectively, and $D_{it}^{shareclass}$ is a dummy that takes on the value one if the fund is a multiple-share class fund, and zero otherwise. $\tilde{\sigma}_{it}^{(2),\text{int}} - \tilde{\sigma}_{it}^{(1)}$ is the median change in intended risk of all funds in the same segment and $\sigma_{it}^{(1)}$ is the realized fund risk in the first half of the year. The last two rows present the adjusted R^2 and the number of observations. ***, **, and * indicate significance at the one, five, and ten percent level, respectively. t-values are reported in parentheses.

Table 5

(continued)

Independent Variable	(1)	(2)	(3)	(4)
$rank_{it} \cdot D_t^{CI}$	-0.007 ***	-0.006 ***	-0.008 ***	-0.007 ***
	(-6.695)	(-6.370)	(-6.589)	(-6.816)
$rank_{it} \cdot D_t^{EI}$	0.015 ***	0.014 ***	0.015 ***	0.014 ***
	(10.381)	(9.312)	(9.389)	(9.291)
$\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}$	-0.029 ***	-0.020 **	-0.003	-0.012
	(-2.964)	(-1.939)	(-0.291)	(-1.222)
$(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}) \cdot D_{it}^{pos}$	-0.064 ***	-0.067 ***	-0.069 ***	-0.063 ***
	(-3.297)	(-3.428)	(-3.345)	(-3.262)
$\ln(tna)_{it}$	-0.000 *	-0.000 **	-0.000	-0.000
	(-1.765)	(-2.291)	(-0.390)	(-1.275)
$\ln(age)_{it}$	0.000	0.000	-0.000	0.000
	(0.065)	(0.726)	(-1.058)	(0.269)
D_{it}^{load}	0.000	0.000	0.000	0.001
	(0.620)	(0.718)	(0.371)	(.925)
$expenses_{it}$	0.018	-0.018	-0.108	-0.048
	(0.313)	(-0.323)	(-1.182)	(-0.479)
$turnover_{it}$	-0.001 **	-0.001 ***	-0.001 **	-0.001 **
	(-2.318)	(-2.739)	(-2.159)	(-2.419)
$D_{it}^{shareclass}$	0.001	0.001	-0.000	0.000
	(0.806)	(1.193)	(-0.099)	(0.691)
$\tilde{\sigma}_{it}^{(2),\text{int}} - \tilde{\sigma}_{it}^{(1)}$	1.036***	1.072***	1.090 ***	1.090 ***
	(17.991)	(18.906)	(18.083)	(19.091)
$\sigma_{it}^{(1)}$	-0.036 ***	-0.053 ***	-0.053 ***	-0.058 ***
	(-5.010)	(-6.459)	(-4.443)	(-6.778)
Segment Fixed Effects	No	Yes	Yes	Yes
Family Fixed Effects	No	No	Yes	No
Individual Random Effects	No	No	No	Yes
Adj. R^2	0.171	0.174	0.183	0.172
Observations	17,570	17,570	14,239	17,570

Table 6

Impact of Manager Tenure

This table presents the coefficients of the following regression estimated with time fixed effects, panel-corrected standard errors (PCSE) and different combinations of segment fixed, family fixed, and individual random effects:

$$\begin{aligned}\sigma_{it}^{(2),\text{int}} - \sigma_{it}^{(1)} = {} & a + b_0^{CI} \cdot rank_{it}^{(1)} \cdot D_t^{CI} + b_1^{CI} \cdot rank_{it}^{(1)} \cdot D_t^{CI} \cdot D_{it}^{HT} \\ & + b_0^{EI} \cdot rank_{it}^{(1)} \cdot D_t^{EI} + b_1^{EI} \cdot rank_{it}^{(1)} \cdot D_t^{EI} \cdot D_{it}^{HT} \\ & + c \cdot \left(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}\right) + c^{pos} \cdot \left(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}\right) \cdot D_{it}^{pos} \\ & + d \cdot \ln(tna)_{it} + e \cdot \ln(age)_{it} + f \cdot D_{it}^{load} + g \cdot expenses_{it} \\ & + h \cdot turnover_{it} + i \cdot D_{it}^{shareclass} + j \cdot \left(\tilde{\sigma}_{it}^{(2),\text{int}} - \tilde{\sigma}_{it}^{(1)}\right) + k \cdot \left(\sigma_{it}^{(1)}\right) \\ & + l \cdot tenure_{it} + \varepsilon_{it}.\end{aligned} \qquad (8)$$

In this model, $rank_{it}^{(1)}$ is the rank of fund *i* in its segment based on raw returns in the first half of year *t*. D_t^{CI} (D_t^{EI}) is a dummy variable which is equal to one if the compensation incentives (employment incentives) are more important, and zero otherwise. D^{HT} is a dummy that takes on the value one if the tenure of the fund manager is above the median tenure of all fund managers, and zero otherwise. Alternatively, we also estimate a modified version of Model (8), where we replace the high tenure dummy variable with $tenure_{i,t}$. $tenure_{i,t}$ is the time in years since the fund manager first entered the industry. $\sigma_{it}^{(2),\text{int}}$ is the intended risk of the fund manager in the second half of year *t*. $\sigma_{it}^{(1)}$ is the realized risk in the first half of year *t*. $\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}$ is the risk surprise in the first half of the year. D_{it}^{pos} is a dummy variable which is equal to one, if $\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}$ is positive, and zero otherwise. $\ln(tna)_{it}$ and $\ln(age)_{it}$ are the natural logarithm of fund total net assets and fund age, respectively, D_{it}^{load} is a dummy indicating the load status of fund *i* which takes on the value one if any of the share classes of the fund charges a load, and zero otherwise, $expenses_{it}$ and $turnover_{it}$ are the expense ratio and the turnover ratio of fund *i*, respectively, and $D_{it}^{shareclass}$ is a dummy that takes on the value one if the fund is a multiple-share class fund, and zero otherwise. $\tilde{\sigma}_{it}^{(2),\text{int}} - \tilde{\sigma}_{it}^{(1)}$ is the median change in intended risk of all funds in the same segment and $\sigma_{it}^{(1)}$ is the realized fund risk in the first half of the year. The last two rows present the adjusted R^2 and the number of observations. ***, **, and * indicate significance at the one, five, and ten percent level, respectively. t-values are reported in parentheses.

Table 6

(continued)

Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$rank_{it} \cdot D_t^{CI}$	-0.010 ***	-0.011 ***	-0.009 ***	-0.010 ***	-0.010 ***	-0.011 ***	-0.010 ***	-0.010 ***
	(-5.511)	(-4.954)	(-5.267)	(-4.764)	(-5.510)	(-5.004)	(-5.574)	(-4.906)
$rank_{it} \cdot D_t^{EI}$	0.018 ***	0.018 ***	0.017 ***	0.017 ***	0.016 ***	0.016 ***	0.017 ***	0.017 ***
	(7.397)	(6.334)	(6.897)	(5.967)	(6.384)	(5.590)	(6.760)	(5.960)
$rank_{it} \cdot D_t^{CI} \cdot D_{it}^{HT}$	0.005 ***		0.004 **		0.005 **		0.004 **	
	(2.605)		(2.566)		(2.431)		(2.509)	
$rank_{it} \cdot D_t^{EI} \cdot D_{it}^{HT}$	-0.001		-0.001		-0.002		-0.001	
	(-0.660)		(-0.667)		(-0.809)		(-0.667)	
$rank_{it} \cdot D_t^{CI} \cdot tenure_{it}$		0.000 **		0.001 **		0.001 **		0.000 **
		(2.175)		(2.168)		(2.133)		(1.982)
$rank_{it} \cdot D_t^{EI} \cdot tenure_{it}$		-0.000		-0.000		-0.000		-0.000
		(-0.133)		(-.255)		(-0.389)		(-0.439)
$\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}$	-0.032 **	-0.032 **	-0.024	-0.023	-0.015	-0.014	-0.017	-0.017
	(-2.155)	(-2.106)	(-1.601)	(-1.549)	(-0.985)	(-0.941)	(-1.166)	(-1.121)
$(\sigma_{it}^{(1)} - \sigma_{it}^{(1),\text{int}}) \cdot D_{it}^{pos}$	-0.055 *	-0.056 *	-0.058 *	-0.059 *	-0.046	-0.047	-0.053 *	-0.054 *
	(-1.837)	(-1.872)	(-1.921)	(-1.957)	(-1.580)	(-1.617)	(-1.776)	(-1.815)
$\ln(tna)_{it}$	-0.000 *	-0.000	-0.000 *	-0.000 *	-0.000	-0.000	-0.000	-0.000
	(-1.702)	(-1.636)	(-1.950)	(-1.890)	(-0.645)	(-0.621)	(-1.562)	(-1.514)
$\ln(age)_{it}$	0.000	0.000	0.000	0.000	-0.000	-0.000	0.000	0.000
	(0.723)	(0.751)	(1.126)	(1.157)	(-0.796)	(-0.779)	(0.780)	(0.819)
D_{it}^{load}	0.000	0.000	0.000	0.000	-0.000	-0.000	0.000	0.000
	(0.319)	(0.268)	(0.235)	(0.183)	(-0.090)	(-0.118)	(0.303)	(0.266)
$expenses_{it}$	0.061	0.063	0.038	0.040	-0.060	-0.058	0.042	0.044
	(0.843)	(0.874)	(0.533)	(0.561)	(-0.504)	(-0.488)	(0.552)	(0.570)
$turnover_{it}$	-0.001 *	-0.001 *	-0.001 **	-0.001 **	-0.001 **	-0.001 **	-0.001 **	-0.001 **
	(-1.715)	(-1.739)	(-1.991)	(-2.018)	(-2.328)	(-2.350)	(-1.981)	(-2.002)
$D_{it}^{shareclass}$	0.002 *	0.002 *	0.002 **	0.002 *	0.000	0.000	0.002 *	0.002 *
	(1.782)	(1.772)	(1.961)	(1.953)	(0.163)	(0.177)	(1.697)	(1.694)
$\tilde{\sigma}_{it}^{(2),\text{int}} - \tilde{\sigma}_{it}^{(1)}$	1.042 ***	1.042 ***	1.134 ***	1.135 ***	1.138 ***	1.140 ***	1.133 ***	1.135 ***
	(11.539)	(11.548)	(12.171)	(12.188)	(12.224)	(12.259)	(12.242)	(12.266)
$\sigma_{it}^{(1)}$	-0.037 ***	-0.037 ***	-0.053 ***	-0.053 ***	-0.063 ***	-0.063 ***	-0.061 ***	-0.061 ***
	(-3.041)	(-3.047)	(-3.928)	(-3.946)	(-4.352)	(-4.374)	(-4.332)	(-4.346)
$tenure_{it}$	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.097)	(-0.615)	(-0.220)	(-0.653)	(-0.122)	(-0.494)	(-0.020)	(-0.332)
Segment Fixed Effects	No	No	Yes	Yes	No	No	No	No
Family Fixed Effects	No	No	No	No	Yes	Yes	No	No
Individual Random Effects	No	No	No	No	No	No	Yes	Yes
Adj. R^2	0.165	0.164	0.167	0.167	0.198	0.199	0.166	0.166
Observations	7,521	7,521	7,521	7,521	7,521	7,521	7,521	7,521

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