Loss Averse Preferences, Performance, and Career Success of Institutional Investors

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Abstract

Using survey-based measures of loss aversion of mutual fund managers, we study the effects of institutional investor preferences on their investment decisions, performance, and career outcomes. Funds managed by managers with higher aversion to losses take on less downside risk and have lower risk-adjusted returns. More loss averse managers are more likely to have their contracts terminated. Our results indicate that fund management companies may improve quality of hiring decisions by screening prospective managers on the degree of their loss aversion to ensure better match between managerial characteristics and fund's objectives.

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> "It is a deeply ingrained behavioral trait ... that all human beings have – this underlying phenomenon that 'I really, really dislike losses, and I will do all I can to avoid losing something.'"
>
> John List in the interview to "Chicago Sun Times"

Growing experimental and empirical evidence suggests that economic agents are more sensitive to losses than gains. Investors with loss averse preferences care not only about risk and return, but also about the likelihood of losing money and are willing to pay a premium for securities with lower downside risk (Ang, Chen, and Xing, 2005). This should result in underperformance of their portfolios relative to traditional asset pricing benchmarks. Additionally, assets with a lower chance of suffering a drop in price would be primarily owned by more loss-averse investors.

Do institutional investors have loss-averse preferences? And if so, do these preferences for avoiding losses get reflected in their portfolio choice, performance, and career success? These important questions have long been the subject of much debate. First, the literature traditionally maintained that loss aversion attributes primarily to individual investors; whereas professional asset managers are supposed to be immune to behavioral biases due to their greater sophistication, better resources, lower search and processing costs, regulation etc (Burns, 1985, Holt and Villamil, 1986). Indeed, Christensen-Szalanski and Beach (1984) and Bonner and Pennington (1991) state that experimental studies that employed professionals rather than students usually report behavior in line with expected utility paradigm.[1] Recent work by Haigh and List (2005) and Bias and Weber (2009), however, suggest that investment professionals may exhibit large aversion to losses (at times even greater than control groups of students).

Second, evidence linking loss aversion of institutional investors to performance is also mixed. Locke and Mann (2005) document that professional traders hold on to losses significantly longer than gains, but find no evidence that it lowers their profits, a finding that they attribute to trading discipline. On the other

[1] Experimental work by List (2002, 2003, 2004) and empirical studies by Feng and Seasholes (2005), O'Connell and Teo (2009), and Seru, Shumway, and Stoffman (2010) corroborate this argument and find that market anomalies are substantially attenuated among real economic players who have significant market experience.

hand, Garvey and Murphy (2004) conclude that investment professionals could increase their trading profits by mitigating loss averse behavior.

The key challenge to prior research investigating the effect of investment professionals' attitudes toward risk on their decisions and performance is that on-the-job behavior of professionals is determined not only by their preferences, but also by incentives and constraints imposed by institution's organization (e.g., Chevalier and Ellison, 1999a, Baks, 2003). This, on the one hand, raises concerns whether the results of experimental studies could be generalized to financial markets. Indeed, high aversion to losses exhibited by investment professionals in pressure-free experiments which involve hypothetical pay-offs (e.g., Haigh and List, 2005, Kaustia Alho, and Puttonen, 2008) may be moderated in high stakes real work environment where, for example, career concerns also play the role. On the other hand, it is unclear what conclusions could be drawn from studies which explore behavior of professional investors without explicitly controlling for *both* their preferences *and* incentives. For example, the loss-averse behavior following short-term underperformance may be caused either by investor's preference to avoid losses or by institutionally imposed incentives to meet target performance (Chevalier and Ellison, 1997, Coval and Shumway, 2005).

Therefore, to establish a causal link between investment professionals' loss aversion and their performance researchers ideally should be able both to directly relate loss-aversion of institutional investors to their actual decisions and to disentangle the effect of investors' preferences from that of organizational incentives. We believe that our paper comes closest to achieving these objectives.

In this paper, we use investor level estimates of loss aversion of mutual fund managers to provide the direct evidence on its effect on their investment decisions, performance, and career outcomes. We obtain our measures of managerial loss aversion by asking a group of 194 fund managers in Sweden about their willingness to participate in a single or several risky lotteries (Fehr and Goette, 2007). The number of lotteries that a participant rejects provides an indication of manager's degree of loss aversion. Similar measures have been used in prior studies investigating loss averse behavior in labor supply (Gächter, Herrmann, and Johnson, 2007) and provision of effort (Abeler, Falk, Goette, and Huffman, 2011). Since

there is a sizeable time gap between the date of survey administration (March 2004) and the end of our sample period (December 2012), it allowed us not only to analyze subsequent portfolio decisions and performance of fund managers, but also to observe their career success in the asset management industry.

We find that there is a considerable variation in the degree of loss-aversion among fund managers: about 37% of responding managers could be characterized as having high aversion to losses, 25% have low loss aversion with the remaining managers 38% falling into the middle loss aversion category. Managers with high loss aversion are more likely to be employed by funds that are concerned about capital preservation, e.g., fixed income and balanced funds, whereas managers with low loss aversion primarily work for funds which pursue aggressive investment policies, e.g., international funds or hedge funds. We show that some of this has to do with the attrition of highly loss averse managers from risky funds; self-selection of managers into fund style categories and / or initial screening by fund management companies probably also play the role.

We then demonstrate that managerial loss-aversion has significant effect on downside risk of funds' portfolios. Controlling for manager (age and gender) and fund (MF style, fund family, size, past performance) characteristics, and systematic riskiness of fund's portfolio (market beta) we find that fund's downside beta is about 0.176 larger if fund manager's loss-aversion is low rather than when it is high (or 13.24% relative to the sample mean).[2] Similarly, funds with low loss-aversion managers exhibit higher semi-variance (by 19.70% relative to the sample mean).

Our results are robust to controlling for managerial risk tolerance, which we elicited by asking managers a sequence of questions about their willingness to gamble on lifetime income (Barsky, Juster, Kimball, and Shapiro, 1997). Though managerial risk tolerance and loss aversion are correlated (coefficient of 0.15, not statistically significant), risk tolerance does not affect fund's downside risk.

[2] Our experimental protocol sorts managers into three (low, median, and high) groups by loss-aversion. We describe the procedure in detail in Section 2.

Higher managerial loss-aversion also results in lower performance: funds run by managers whose loss-aversion is high deliver between 9.6bp and 17.4bp lower monthly risk-adjusted returns (or between 1.16% and 2.11% per year) than funds which managers have low aversion to losses.

Consistent with these results, we find that more loss averse managers are more likely to leave the asset management industry or to move to a smaller fund. The likelihood that high loss aversion manager has his or her contract involuntary terminated before the end of our sample period is 36.00%; the corresponding probability for low loss aversion manager is only 5.88%.

To our knowledge, our paper is the first to demonstrate that preferences of institutional investors involve aversion to losses and this loss aversion has direct and economically significant effect on their decisions, performance, and career outcomes.

Our results also have important implications for the mutual fund industry. They indicate that managers' personal attitudes toward risk are not fully mitigated by funds' organizational incentives and have direct effect on the quality of their decisions and performance. This suggests that fund management companies may be able to achieve a better match between managerial decision making and fund's objectives by screening prospective managers on the degree of their loss aversion.

The paper which is most complementary to ours is Graham, Harvey, and Puri (2013). They administer a survey to senior corporate executives to gauge their psychological traits and attitudes, e.g., risk-aversion, optimism, aversion to sure losses etc; some of the questions in their survey are exactly the same as the ones that we use. Graham et al. (2013) then demonstrate that CEO's traits are related to corporate policies and managerial compensation.

Our paper is distinct from Graham et al. (2013) along two important dimensions. Firstly, their sample is dominated by industrial firms whereas our focus is on mutual funds. Hence, we study decisions over different types of assets, i.e., financial assets instead of real assets. This feature of our sample also allows us to pin down the causal effect of managerial attitudes on the outcomes of their decisions with a higher degree of confidence. Indeed, many corporate policies of industrial companies, e.g. payout policy, leverage etc, are significantly historically path dependent, so they still bear the legacy of executives long

departed (Brav, Graham, Harvey, and Michaely, 2004). On the contrary, Jin and Scherbina (2011) show that it takes only about two quarters for newly appointed mutual fund managers to reshape funds' portfolios to their own tastes. Secondly, by deliberately allowing eight years to pass since the date of survey distribution and the end of our sample, we are able to expand our analysis to the career success of managers[3].

The reminder of the paper is organized as follows. In Section 2 we describe our experimental design and discuss distribution of survey-elicited managerial preferences across mutual fund style categories. Section 3 relates managerial loss aversion to downside risk of fund's portfolio. In Section 4 we investigate the impact of managerial loss aversion on fund's performance. Section 5 considers managerial career success. A brief conclusion follows.

2. Experimental Design and Distribution of Managerial Attitudes toward Risk

At the end of March, 2004 we sent out a questionnaire to a group of 194 mutual fund managers in Sweden. The list of managers was obtained by going through the directories and websites of Swedish mutual funds and fund families and was intended to be comprehensive, i.e., include all Swedish mutual fund managers; we focus on actively managed funds. The questionnaire was accompanied by the cover letter (both in Swedish), explaining that this is a survey on attitudes toward risk conducted by the top Swedish business school (Stockholm School of Economics), a prepaid return envelope, and a lottery ticket for the popular Swedish lottery (TRISS). Additionally, a gift card for 2000 SEK (approximately $260) was promised to a winner randomly drawn among those participants who returned the completed questionnaire within 8 weeks. These were meant to create incentives for managers to respond in a timely fashion.

Though we were not able to physically verify that managers filled in the questionnaires themselves or that they were truthful in their responses, several facts suggest that our method was valid and reliable and

[3] Graham et al. (2013) have about seven years between the time of survey distribution and the date of publication which would also enable them to study career outcomes of executives; it is not, however, a part of their paper.

the sample of responding managers is representative. First, the response rate was a high 35.75% (or 69 out of 194 managers)[4]. Second, we compared the samples of responding and non-responding managers based on observable manager and fund characteristics and determined that they are remarkably similar (see Appendix 1). Third, we received a large number of phone calls directly from managers inquiring about the results of the survey and the outcome of the lottery draw. Finally, the winner showed up in person to collect the monetary prize and discuss the results of the survey.

Aside from asking managers to reveal their identity, gender, and age, the questionnaire invited them to answer two survey questions described below.

Our final sample consists of 68 managers. The sample size is very comparable to other studies which involved experiments with investment professionals. For example, Haige and List (2005) sample contains 54 professional traders from Chicago Board of Trade.

The goal of our survey was to gauge fund managers' attitudes toward risk. Traditionally it has been assumed that investors have risk averse preferences, i.e., they avoid gambles with uncertain payoffs if certain prospects with equivalent expected payoffs are available. A large body of experimental evidence, however, demonstrates that agents do not treat gains and losses symmetrically, but instead they are willing to gamble when facing a possibility of a certain loss, i.e., they have loss-averse preferences. In our paper we follow the approach which have received significant traction in the literature (e.g. Gul, 1991, Barberis and Huang, 2001, Barberis, Huang, and Santos, 2001) and let managers' utilities to contain both risk-aversion and loss-aversion components. While the survey design does not allow us to evaluate the exact shape of the utility function, it enables us to rank managers by risk-aversion and loss-aversion dimensions separately and study cross-sectional variation in managerial attitudes toward risk on their decisions, performance, and careers outcomes.

[4] Graham, Harvey, and Rajgopal (2005) obtain a response rate of 10%, Trahan and Gitman (1995) 12%, Graham and Harvey (2001) 9%, Graham et al. (2005) 16%, and Graham et al. (2013) 11%.

Survey Question 1: Loss Aversion

In the first survey question, the participants were presented with the opportunity to participate in the following two lotteries (Fehr and Goette, 2007); subjects could participate in both lotteries, in any single lottery, or they could reject them both:

Lottery A: Win 30 SEK with probability ½, lose 20 SEK with probability ½. If you reject this lottery you receive nothing.

Lottery B: This lottery consists of six independent repetitions of lottery A. If you reject this lottery you receive nothing.[5]

The number of lotteries that a participant rejects provides an indication of subject's degree of loss aversion. In particular, subjects who reject lottery A have a higher level of loss aversion than subjects who accept lottery A. Similarly, subjects who reject lottery A and B are more loss averse than subjects who reject only lottery A. Additionally, if subject's loss aversion is consistent across lotteries then anyone who rejects lottery B should also reject lottery A as the rejection of lottery B implies higher degree of loss aversion than only rejection of lottery A. In the Appendix 2 we provide formal derivations of this for an agent with Gul's (1991) disappointment utility function.

One can possibly suggest that the rejection of lotteries A and/or B could be explained with standard risk aversion. Rabin (2000), however, demonstrated that people must be risk-neutral over low stake gambles like ours and, thus, rejected this interpretation. The intuition is that risk averse behavior for low stake gambles implies extremely high levels of risk aversion for slightly higher, but still moderate stake levels (Abeler et al., 2011).

The responses that we have received were distributed as follows: 25 managers rejected both lotteries (high degree of loss aversion), 26 rejected only lottery A (middle degree of loss-aversion), and 17 accepted both lotteries (low degree of loss aversion). [6]

[5] 30 SEK (20 SEK) was approximately $3.75 ($2.50) at the time of survey.

Mutual funds that employ managers in our sample vary considerably by their investment objectives / styles. We therefore split these mutual funds into three broadly defined style categories based on the potential for downside risk: 1) Fixed Income and Balanced Funds; 2) Domestic (Sweden and other Scandinavian countries) Equity Funds; and 3) International (excluding other Scandinavian countries) Equity and Hedge Funds – and consider distribution of managerial loss-aversion across these style categories.[7]

Figure 1 presents percentage of managers in each style category falling into a corresponding loss-aversion group. We observe that funds which pursue most aggressive investment policies associated with high likelihood of short-term losses, i.e., foreign equity funds and hedge funds, tend to employ managers with low aversion to losses. On the contrary, funds primarily concerned with preservation of capital, i.e., bond and balanced funds, are mostly run by high loss-aversion managers.

This visual observation is confirmed in Table 1 which reports average managerial loss-aversion across mutual fund style categories. We assign a loss aversion value of 0 (1, 2) if a manager falls into a low (middle, high) loss aversion category and aggregate values for each style category. The average (median) loss-aversion of managers in Fixed Income / Balanced funds style is 1.320 (2.000) whereas the average (median) loss-aversion of managers in International Equity / Hedge Funds style is 0.875 (1.000); the corresponding differences are significant at the 10% level.

The results of loss-aversion part of our survey indicate that matching of managers into mutual funds is not random: e.g., funds with high potential for a large short-term negative performance are run by managers which are more able to tolerate losses. This potentially can be a sign of self-selection of managers into mutual fund style categories. In Section 5, however, we demonstrate that at least some of this has to do with the attrition of highly loss managers from more risky funds.

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[6] We had 1 manager whose responses violated consistency of loss aversion across lotteries (i.e., this person rejected lottery B, but accepted lottery A); this manager was removed from the analysis.

[7] Though there were several funds investing in continental Europe and North America, most of international funds (69%) invested in developing markets, e.g. Asia and Eastern Europe, or invested globally.

It is also possible that the characteristics of the workplace could shape preferences of the employee. For example, highly loss-averse manager hired by a hedge fund may adapt to the demands of his or her job and become more tolerant to losses over time. This would, however, suggest that loss-aversion of more experienced fund managers should deviate less from the average loss-aversion of fund's style category, i.e., we should observe convergence of managerial loss-aversion to the style's average over time.

In order to rule out this interpretation, we calculate the absolute difference between manager's loss-aversion and the average loss-aversion of managers in his or her mutual fund style category and relate it to manager's age, which is used as a proxy for manager's experience. Our results (unreported) show that, on the contrary, loss-aversion of younger managers is closer to the style's average (though the relationship is not statistically significant at conventional levels); this holds whether we consider the unconditional relationship between deviation in manager's loss-aversion and his / her experience or account for manager and fund characteristics.

Survey Question 2: Risk Tolerance

In the second survey question, we asked managers a sequence of questions about their willingness to gamble on life-time income (Barsky et al., 1997).

#1. Suppose that you are the only income earner in the family, and you have a good job guaranteed to give you your current (family) income every year for life. You are given the opportunity to take a new and equally good job, with a 50-50 chance it will double your (family) income and 50-50 chance that it will cut your (family) income by a third. Would you take a new job?

Yes. If Yes, go to #2

No. If No, go to #3

#2. Suppose the chances were 50-50 that it would double your (family) income and 50-50 chance that it will cut it in half. Would you still take the new job?

Yes. Stop here. We thank you for your effort and time!

No. Stop here. We thank you for your effort and time!

#3. Suppose the chances were 50-50 that it would double your (family) income and 50-50 chance that it will cut it by 20% percent. Would you still take the new job?

Yes. Stop here. We thank you for your effort and time!

No. Stop here. We thank you for your effort and time!

The important feature of this experiment is that it involves choices over significant monetary stakes – a gamble involving stakes that have little impact on subject's allocation of resources over a lifetime should not require risk-premium.

Each respondent answers two questions (#1 and #2, or #1 and #3); these two responses place them into four categories by risk aversion. Let α denote the percentage income cut. If the respondent chooses to take the risk that could result in a cut in income of α, than, assuming constant relative risk aversion, subject's relative risk aversion *A* could be determined from the following relationship (Hanna, and Lindamood, 2004):

$$\alpha = 1 - (2 - 2^{1-A})^{\frac{1}{1-A}}.$$

Consistent with prior studies on the demand for risky assets (e.g., Breeden, 1979, Barsky et al., 1997) we use relative risk tolerance, defined as $\theta = \frac{1}{A}$, as a relevant preference parameter. Given that our survey provides bound on the values of relative risk tolerance of participants, we assign each category the value of risk tolerance equal to its unconditional mean (Barsky et al., 1997).[8] In particular, if a respondent rejected both one-third and one-fifth, his / her risk-tolerance parameters is set to equal 0.11; if he / she rejected one-third, but accepted one-fifth then θ=0.36; if he or she accepted one-third, but rejected one-half, then θ=0.68, and when he or she accepted both one-third and one-fifth then θ=1.61.

The distribution of managers' responses across risk-tolerance groups is as follows: 22 managers do not consider that jeopardizing one-fifth of their income is worth the chance of doubling it (lowest risk

[8] Our results are not affected to any degree if we use alternative values for risk-tolerance (e.g., lower bounds, conditional expected values etc).

tolerance group), 31 managers would consider risking one-fifth of their income, but not one-third (second lowest risk tolerance group), 11 managers would risk one-third, but not one-half (second highest risk tolerance group), and, finally, only 4 managers were willing to forego one-half of their income for the 50% chance to double it (highest risk tolerance group).

We also explore the distribution of managerial risk tolerance across mutual fund style categories (Figure 2). Visually, there does not appear to be any discernible relationship between managerial risk-aversion and mutual fund style category. This is supported by statistical tests performed in Table 2: both mean and median analyses fail to identify statistically meaningful differences in managerial risk-tolerance across fund styles.

The correlation between measures of managerial loss aversion and risk tolerance is fairly low: it is about 25% for ordinal measures of loss-aversion and risk tolerance and about 15% when we relate cardinal values of risk-tolerance to ordinal rankings of loss-aversion. This suggests that loss-aversion and tolerance for risk are distinct features of managerial attitudes toward risk.

3. Managerial Loss-Aversion and Downside Risk of Mutual Fund Portfolios

We proceed to relate our survey based measures of managerial loss-aversion to the downside risk of their mutual fund portfolios. For data availability reasons explained below, we consider the period between 2001 and 2012. Since our questionnaire was distributed in 2004, we needed to account for the fact that managers which responded to our survey may have joined or left their funds at some point within this period. We therefore went through funds' annual prospectuses and dropped from our analysis fund-year-months when the manager was not yet or no longer in charge of the fund.

Additionally, we excluded pure fixed income funds – there were sixteen of them. Though our results are not qualitatively affected, we believe that inclusion of pure fixed income funds is unwarranted as downside risk exposure of these funds is not best described by fund returns comovement with the equity market returns. Our final sample consists of 323 fund-year observations for 52 funds or about 6.2 observation-years per fund manager.

We consider two measures of fund's downside risk. The first one is fund's Downside Beta (Bawa and Lindenberg, 1977, Ang et al., 2005):

$$\beta^{-} = \frac{cov((r_i, r_m | r_m < \mu_m)}{var(r_m | r_m < \mu_m)},$$

while the second measure is fund's Target Semivariance (Markowitz, 1959):

$$SVar = E[((r_i - \mu_m)^2 | r_i < \mu_m)],$$

where $r_i (r_m)$ is fund i's (the market's) excess return, and μ_m is the average market excess return. In the latter case we use average market return over the estimation window as the corresponding target rate of return. Our results are not affected if we utilize alternative target rates, e.g., zero return or the average mutual fund style return.

Both measures of downside risk are estimated with monthly mutual fund returns over the previous 60 months; the data comes from MoneyMate. The estimations are performed annually (in January of each year) resulting in one observation per fund per year. Additionally, to control for fund's portfolio overall riskiness we estimate fund's Beta (β) and Variance (Var).

To establish a direct relationship between investment professionals' loss aversion and their decisions we need to disentangle the effect of investor preferences from that of organizational incentives. To do so, ideally we would like to observe detailed contracts of managers and possess information on funds' organizational culture, i.e., "the set of shared mental assumptions that guide interpretation and actions in organizations by defining appropriate behavior for various situations" (Ravasi and Schultz, 2006). Unfortunately, the data on neither of these dimensions is available. We therefore aim to control for managerial incentives with the combination of mutual fund style and fund family fixed effects. The intuition is that funds within the same style category should have similar contractual incentives, whereas fund family fixed effects account for the differences in organizational structure between fund families.

In particular, we assign to a fund a distinct mutual fund family dummy if its family has at least three mutual funds in our sample. These include SEB (7 funds), Swedbank and Skandia (both 6 funds),

Handelsbanken (5 funds), Nordea (4 funds), Alfred Berg, AMF, HQ, and Öhman (3 funds each); remaining 12 funds were assigned "other" category. We also consider three broad groups of mutual funds by style (as defined before): 1) Fixed Income and Balanced Funds; 2) Domestic (Sweden and other Scandinavian countries) Equity Funds; and 3) International (excluding other Scandinavian countries) Equity and Hedge Funds. Additionally, we control for fund size and past performance, age, gender, and risk tolerance of its manager, and include time (year) fixed effects.

In Table 3 we relate managerial loss aversion to fund's downside beta, β^-.[9] Our key variable of interest is Loss Aversion to which we assign the value of 0 if the manager exhibits low degree of loss-aversion as obtained in the Survey 1 (i.e., accepts both lotteries), 1 if his or her loss-aversion falls into a middle category (i.e., rejects lottery A, but not B), and 2 is manager's loss-aversion is high (i.e., rejects both lotteries).

Panel A reports the results of Fama-MacBeth regressions with Newey-West adjusted standard errors. Panel B reports results of panel regressions with standard errors clustered at the manager level. All variables are described in Appendix 3.

We find that the larger the manager's aversion to losses, the lower is the fund's downside beta. This relationship is also very persistent across all specifications and sets of controls. From the specification 2 in Panel A (Fama-MacBeth) we estimate that, if manager's loss-aversion is low (0), fund's β^- is smaller by about 0.176 relative to the case when manager's loss-aversion is high (2); this difference corresponds to about 13.236% of the sample mean. Likewise, from specification 2 in Panel B (panel) the difference in β^- which accrues to the variation in loss-aversion from high to low is about 0.072 (or approximately 5.415% relative to the sample mean).

Importantly, once we control for fund's regular beta, managerial risk tolerance is not related to fund's downside risk, nor it mediates the effect of loss-aversion. Younger and male managers tend to choose portfolios with higher downside risk; however, these relationships do not appear to be statistically robust.

[9] Since risk tolerance, as defined earlier, is a cardinal variable, for consistency in the regression analyses we treat los aversion as a cardinal variable as well. Our results are not affected to any degree if we use ordinal rankings of loss-aversion (or risk-tolerance) instead.

It is also worth pointing out that accounting for mutual fund style and fund family affiliation does not appear to have significant and unambiguous effect on the relationship between managerial loss-aversion and downside beta. Whereas including these controls in panel regressions results in slightly lower coefficients for Loss Aversion, the opposite is true in case of Fama-MacBeth regressions. In both cases, the coefficient on Loss Aversion remains statistically and economically significant.

Our findings that managerial loss aversion has negative effect on the downside risk of their portfolios are confirmed in Table 4, where we consider fund's Target Semivariance as an alternative measure of downside risk. Funds managed by managers with low – rather than high – loss-aversion exhibit higher semi-variance: by 19.702% in Fama-MacBeth estimations and by 12.124% in panel regressions (both effects are reported relative to the sample mean).

4. Managerial Loss-Aversion and Mutual Fund Performance

Does loss-aversion of mutual fund managers affect fund returns? The theory does not offer a direct economic channel linking managerial preferences to performance. Instead, the two should be related via the characteristics of mutual fund's portfolio that are affected by managerial attitudes toward risk: as we established above, lower managerial loss-aversion results in higher downside risk of mutual fund portfolio which, in turn, should deliver higher return as a compensation for portfolio value's high sensitivity to downside market movements.

Fund's portfolio downside risk could be determined by many factors besides preferences of its manager, e.g., mutual fund style, fund's recent performance and the desire to meet performance benchmarks, fund's organizational structure etc. Thus, the direct exploration of the relationship between downside risk measures and fund's returns would not provide us with the evidence of incremental effect of loss-aversion on performance.

To overcome this issue, we instrument fund's downside risk with loss-aversion and risk aversion of its manager and then use instrumented values of fund's portfolio β^- and SVar as predictors of fund's

returns.[10] In this way, we capture the incremental relationship between downside risk and performance which accrues to managerial loss aversion.

We report the results in Table 5. The dependent variable is 2- (8-) factor adjusted monthly abnormal return on the fund's portfolio. Factors include excess return on domestic and world stock market indexes (four domestic and four world Fama-French-Carhart factors). Factor loadings are estimated over the 3 years prior to the start of the current year. Panel A (B) reports the results for instrumented β^- (SVar). Standard errors are clustered at the fund's level.

Ang et al. (2005) acknowledge that the correlation between downside beta and overall beta is very high, but it is much smaller between downside beta and upside beta. The same is true in our data as well: correlation between β^- and β is about 0.90, but correlation between β^- and β^+ is 0.62. Likewise, the correlation between Target Semivariance and Variance is 0.92, but the correlation between Target Semivariance and Upside Semivariance is 0.65; McAnally, Neel, and Rees (2010) observe a similar magnitude of correlation between these variables.[11]

Therefore, in order to fully control for fund's overall level of riskiness and, at the same time, to mitigate multicollinearity concerns we follow Ang et al. (2005) and include β^+ (Upside Semivariance) alongside instrumented β^- (Target Semivariance) among explanatory variables. As before, we also include fund's size, past return, managerial age and gender as well as time, style category, and fund family dummies. Standard errors are clustered at the manager level.

To assess the quality of Loss Aversion and Risk Aversion as instruments, we report diagnostics statistics. We report the F-statistics and their p-values of the first stage in the instrumental variable regression as well as the Sargan statistics of the test of overidentification for the second stage. In all specifications, the diagnostics show that the instruments – Loss Aversion and Risk Aversion – are

[10] Both loss-aversion and risk tolerance are statistically significantly related to downside risk as could be observed from the last specifications in Table 3, Panel A and Table 4, Panel A.

[11] Upside Semivariance measures the volatility of fund's returns when they above the average market return over the estimation period and is estimated as $USVar = E[((r_i - \mu_m)^2 | r_i \geq \mu_m)]$.

strongly statistically correlated with the endogenous proxy of interest and do not affect the dependent variable of interest through a channel other than its effect via the endogenous explanatory variable.

We find that instrumented measures of downside risk are strongly related to fund's performance; this observation is robust to the choice of performance benchmark and control variables. From specification 2 in Panel A (B), funds run by managers whose loss-aversion is low deliver about 9.6bp (17.4) higher monthly risk-adjusted returns (or between 1.16% and 2.11% per year) than funds which managers have high aversion to losses. Economic impact is calculated in the following way: the difference between high and low loss aversion (2) is multiplied by the coefficient on loss aversion in Specification 2 of Panel B in Table 3 (Table 4) and then multiplied by the coefficient of instrumented β^- (SVar) in Specification 2 of Panel A (Panel B) of Table 5. Controlling for fund family affiliation and fund style characteristics does not affect our results in any material way suggesting that fund's investment objectives and managerial incentives do not crowd out the effect of loss-aversion on performance.[12]

5. Managerial Loss Aversion and Career Success

In this section we examine the effect of loss aversion on career success of fund managers. The results of the previous section indicate that managers with high aversion to losses deliver lower performance. Presumably, actively managed funds exist because investors believe that some managers have superior stock picking abilities. While management companies and investors may initially be uncertain about each manager's skills, they will learn about them over time by observing the returns that manager achieves. While even good managers can have bad returns over the short-term, long-term underperformance is expected to be followed by a higher likelihood of contract termination.

We first explore the relation between managerial loss-aversion and their experience. Prior results suggest that highly loss averse managers should be leaving the asset management industry. Hence, more experienced managers are expected to have lower aversion to losses. From Figure 1 we could observe that

[12] Though mutual funds managed by highly loss averse managers demonstrate poor performance, investors may still value the downside protection that they offer and put money in these funds. We therefore investigated the relationship between managerial loss-aversion and mutual fund flows. We find no evidence that loss aversion or risk aversion of managers are related to fund flows in economically or statistically significant way.

this is indeed the case: average loss-aversion parameters of young managers are larger than for experienced managers both in the overall sample and in every mutual fund style category. Table 6 reports that differences in loss-aversion between young and experienced managers are also statistically significant for all partitioning with the exception of Fixed Income / Balanced funds category.

We then consider the role of loss-aversion on managerial departures from the industry. Similar to Chevalier and Ellison (1999b), we refer to managers as having been "terminated", if they lose their position with the fund and either disappear from fund management, obtain a position at a smaller fund, or leave for personal reasons.[13] A complementary group consists of managers who stayed with the fund, have been promoted to a larger fund, or retired after reaching statutory retirement age.[14]

Summary statistics of manager terminations is presented in Panel A of Table 7 and Figure 4. The data was hand collected from mutual fund websites, media outlets, and social networks (e.g., Facebook, LinkedIn etc). Overall, about 20.59% (or 14 out of 68) managers were fired by the end of our sample period. While this number may appear to be fairly low – Chevalier and Ellison (1999b) report 15.5% termination rate per year for the U.S. fund managers – it is broadly consistent with high labor market rigidity in Sweden.[15]

We observe stark differences in career success across loss aversion categories. High loss averse managers were by far most likely to be terminated as 9 out of 25 of them (or 36.00%) lost their jobs. In contrast, only 1 of 17 (or 5.88%) managers with low aversion to losses was terminated.

High aversion to losses is particularly damaging to managerial career prospects when the fund invests in securities which value can fluctuate a lot over time. From Panel B we could observe that all 4 (or 100.00%) managers with high loss aversion in international equity and hedge funds category were

[13] In one case we traced manager's departure from a fund to a voluntary decision to become stay-home parent. For this we followed Mayer, Franks, and Renneboog (2001) who classified board members departing for reasons "being closer to the family" as forced.

[14] We follow Mayer, Franks, and Renneboog (2001) and "distinguish between natural and forced turnover, classifying a resignation as 'natural' if the director was described as having left the board for reasons of retirement, death or illness. Otherwise the resignation was classified as being forced. The normal retirement age is between 62 and 65 but some voluntary retirement does occur before that; we took 62 as the minimum retirement age and viewed any earlier retirement as forced."

[15] Forteza and Rama (2007) find that the United States has one of the lowest labor market rigidities among industries countries, whereas Sweden has one of the largest.

terminated, but only 1 out of 6 (or 16.67%) of low loss aversion managers was terminated. In contrast, loss aversion appears to have little effect on career success of managers in charge of fixed income funds.

These results are confirmed in the multivariate analysis (Table 7, Panel C). We estimate probit regression where the dependent variable takes the value of one if a manager has been terminated by the end of our sample period and zero when he was not. As a result we have one observation per manager; 68 observations in total. We control for manager gender and age at the start of the sample period, and fund characteristics. Marginal effects are reported; t-statistics is computed adjusting for standard errors clustered at mutual fund style level.

From specification 3 we see that having high rather than low loss aversion relates to 39.36% higher probability of being terminated (or 191.20% relative to the sample mean). Similar to all previous results, the relationship between loss aversion and the likelihood of termination is very robust to inclusion of manager and fund characteristics among control variables.[16]

The results of this paper suggest that there are some systematic cross-sectional differences in fund manager performance that could be attributed to differences in managerial preferences. In particular, they indicate that "stock-picking" ability is hindered by high aversion to losses. The labor market corrects this inefficiency ex-post. However, a simple way to improve the expected fund performance ex-ante could be to screen prospective managers on the degree of their loss aversion.

Our results also help to explain a puzzling fact that many underperforming mutual funds continue to strive in the market place (Gruber, 1996). Christoffersen and Musto (2002) and Gil-Bazo and Ruiz-Verdu (2009) argue that funds with worse past performance have a pool of investors that are less performance sensitive. We show that fund management companies respond to bad performance by firing underperforming managers and identify the source of managerial underperformance, i.e., high degree of their loss aversion. By terminating underperforming manager, a fund management company gets a clean slate with fund investors as the new manager could distance himself from fund's past performance.

[16] In unreported specifications we used dummies for loss aversion categories instead of continuous variable. It shows that it is the group with highest loss aversion that is driving the results.

Conclusion

A large body of empirical literature documents that individual investors are much more sensitive to losses than gains of the same magnitude. As a result they hold on to losers for too long, sell winners too early and, in the process, decrease their trading profits.

The extent to which loss aversion affects investment decisions and performance of institutional investors has been largely an unresolved issue. Prior research has been hindered by difficulties in assessing preferences of institutional investors and / or linking them to their on the job decisions.

Our paper is the first to overcome these issues. We conduct a survey of a group of mutual fund managers to elicit the degree of their loss aversion. We then relate these investor level estimates of loss aversion to the downside risk and performance of mutual funds run by our managers. We show that a) funds run by managers with high aversion to losses have lower downside risk; b) high loss aversion of managers is related to lower funds' risk-adjusted returns which results in c) high likelihood of contract termination.

These findings have important implications for the mutual fund industry. They indicate that managers' personal attitudes toward risk are not fully mitigated by fund's organizational incentives and have direct effect on the quality of their decisions and performance. This implies that fund management companies may want to screen prospective managers on the degree of their loss aversion to ensure a better match between managerial decision making and fund's objectives.

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Appendix 1: Comparison of Responding and Non-Responding Managers

We compare the characteristics of the samples of mutual funds managers which responded to our survey on risk attitudes and those which did not respond. We use the following comparison criteria: 1) size of the fund (in mln Swedish Krona); 2) recognition as one of the top three funds in their mutual fund style category;[17] 3) place among the top three funds in the category (conditional on being ranked in the top three); 4) gender of fund manager; 5) age of fund manager; all of these are measured at the beginning of 2001. Descriptive statistics reported below demonstrates that there are neither statistical nor economic differences between the two samples along any of the comparison criteria.

	responding group		non-responding group					
	mean	median	mean	median	t-test	p-value	Z	p-value
fund size (in millions of Swedish Krona)	1441.35	272.73	918.04	192.00	-1.5473	(0.12)	0.733	(0.46)
recognized as a top 3 fund in mutual fund style category	0.21	0.00	0.16	0.00	-0.9611	(0.34)	-0.961	(0.34)
ranking among top 3 (conditional on being among top 3)	2.17	2.00	2.00	2.00	-0.667	(0.51)	0.681	(0.50)
Gender	0.85	1.00	0.89	1.00	0.8035	(0.42)	0.804	(0.42)
Age	40.19	40.00	37.39	37.00	1.743	(0.09)	1.406	(0.15)

[17] The largest Swedish financial newspaper Dagens Industri together with Morningstar recognizes the top three mutual funds in a variety in categories on yearly basis; the number of categories varies from year to year; occasionally, there could be several funds recognized as runner-ups or third place winners in some categories.

Appendix 2: Agent's Choice over Lotteries A and B in the Loss Aversion Question

In this appendix we derive conditions under which individual with Gul's (1991) disappointment utility function rejects both lotteries A and B.

Gul's disappointment utility function is given by

$$U(\mu_W) = \frac{1}{K}\left(\int_{-\infty}^{\mu_W} u(W)dF(W) + A\int_{\mu_W}^{\infty} u(W)dF(W)\right),$$

where $u(W)$ is the felicity function over end-of-period wealth W, which we choose to be power utility, that is $u(W)=W^{(1-\gamma)}/(1-\gamma)$. The parameter A is defined to be between zero and one, and is the disappointment aversion coefficient; in case A=1 the utility function is equivalent to standard power utility. However, if A<1 then downside risk premium is higher than upside risk premium. F(.) is cumulative distribution function for wealth, μ_W is the certainty equivalent (the certain level of wealth that generates the same utility as the portfolio allocation determining W) and K is a scalar given by:

$$K = Prob(W \leq \mu w) + AProb(W > \mu w).$$

While standard power, or CRRA, utility also produces aversion to downside risk, the order of magnitude of a downside risk premium, relative to upside potential, is economically negligible because CRRA preferences are locally mean-variance.

For lottery A, investors choose to reject it

$$\frac{1}{1+A}(u(W_0 - 20) + Au(W_0 + 30)) < u(W_0),$$

where W_0 is initial level of wealth. Assuming that the lottery is small in comparison with W_0, one can rewrite the condition as

$$\frac{1}{1+A}\left((1+A)u(W_0) + \frac{30A-20}{2}u'(W_0)\right) < u(W_0),$$

or A<2/3.

The individual will reject lottery B if

$$\frac{64}{22+44A}\left[\frac{1}{64}u(W_0-120)+\frac{6}{64}u(W_0-70)+\frac{15}{64}u(W_0-20)+\frac{20}{64}Au(W_0+30)\right.$$
$$\left.+\frac{15}{64}Au(W_0+80)+\frac{6}{64}u(W_0+130)+\frac{1}{64}u(W_0+180)\right]<u(W_0)$$

Under the same assumption, this condition is equivalent to

$$u'(W_0)(39A-21)<0$$

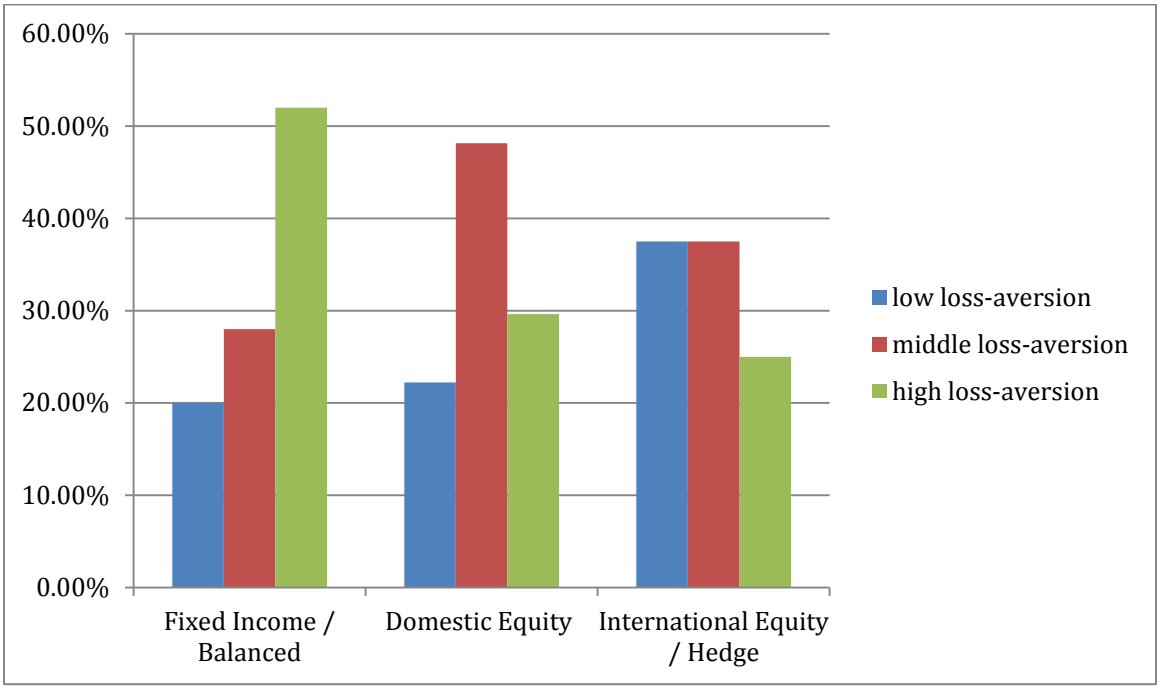
or A<21/39.

Thus, if one rejects lottery B, his/her loss aversion is higher (disappointment aversion coefficient A should be smaller) than for individual who just rejects lottery A.

Appendix 3: Variables definition

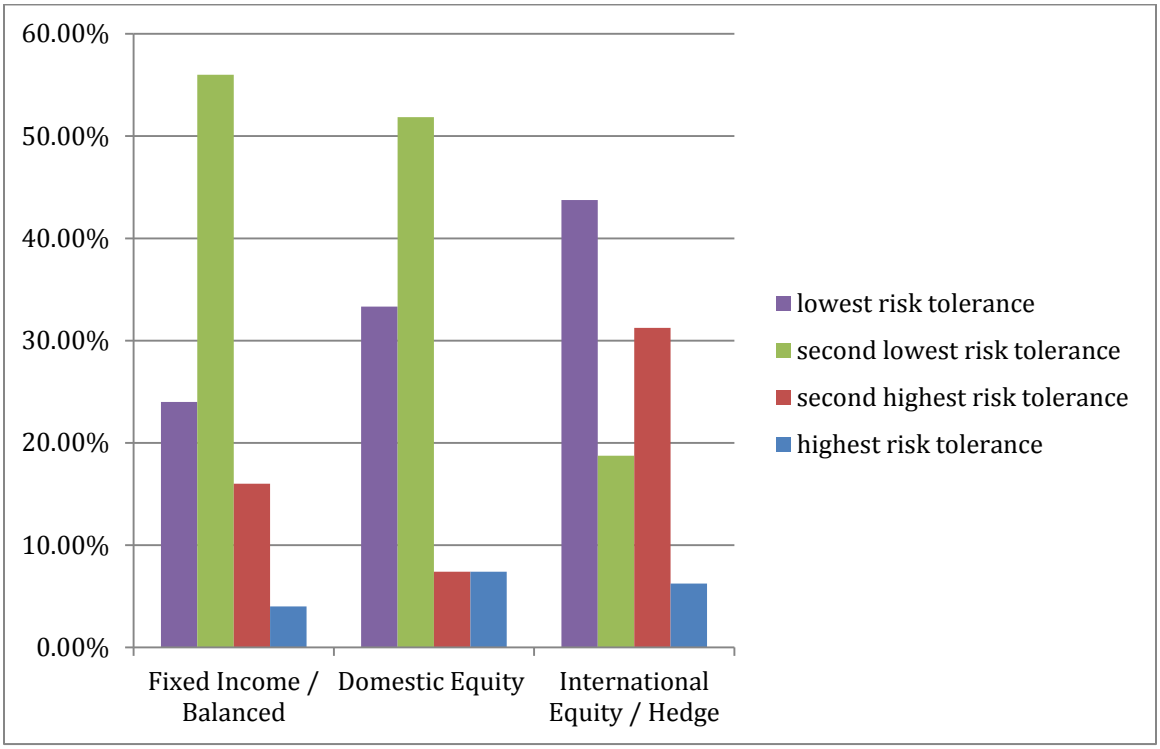
Variable	Description of Variable and Source of Data
Loss Aversion	assigned the value of 0 if the manager accepted both lotteries in Survey Question 1 (low degree of loss-aversion); the value of 1 if rejected only lottery A (middle degree of loss-aversion), and the value of 2 is rejected both lotteries (high degree of loss aversion). For the description of Survey Question 1 see page 5.
Risk Tolerance	assigned the value of 0.11, if a respondent rejected the possibility of reduction of his or her salary both by one-third and one-fifth for the chance to increase his or her salary twofold in Survey Question 2; assigned the value of 0.36 if he / she rejected one-third, but accepted one-fifth; assigned the value of 0.68 if he or she accepted one-third, but rejected one-half, and equals to 1.61 when he or she accepted both one-third and one-fifth. For the description of Survey Question 2 see pages 7 and 8. Risk tolerance parameter values corresponding to respondents' answers to the survey question are taken from Barsky et al. (1997).
Downside Beta, β^-	measures the comovement of asset returns with the market, when market returns are below sample period average, estimated as $\beta^- = \frac{cov((r_i, r_m \mid r_m < \mu_m)}{var(r_m \mid r_m < \mu_m)}$
Upside Beta, β^+	measures the comovement of asset returns with the market, when market returns are above sample period average, estimated as $\beta^+ = \frac{cov((r_i, r_m \mid r_m \geq \mu_m)}{var(r_m \mid r_m \geq \mu_m)}$
Target Semivariance	volatility of portfolio returns when the return is below the target rate of return (we use market index return), estimated as $SVar = E[((r_i - \mu_m)^2 \mid r_i < \mu_m)]$
Upside Semivariance	volatility of portfolio returns when the return is above the target rate of return (we use market index return), estimated as $USVar = E[((r_i - \mu_m)^2 \mid r_i \geq \mu_m)]$
Termination	a dummy variable which takes the value of one if a manager left asset management industry o, moved to a smaller fund, or departed for personal reasons by the end of our sample period, zero otherwise.
Age	age of the manager in years
Gender	gender of the manager, takes the value of 0 for females and 1 for males
Fund size	size of the fund at the end of the previous calendar year (in millions of Swedish Krona)
Past year return	net of fees return on the fund over the previous calendar year

Figure 1. Distribution of Managerial Loss-Aversion across Mutual Fund Style Categories



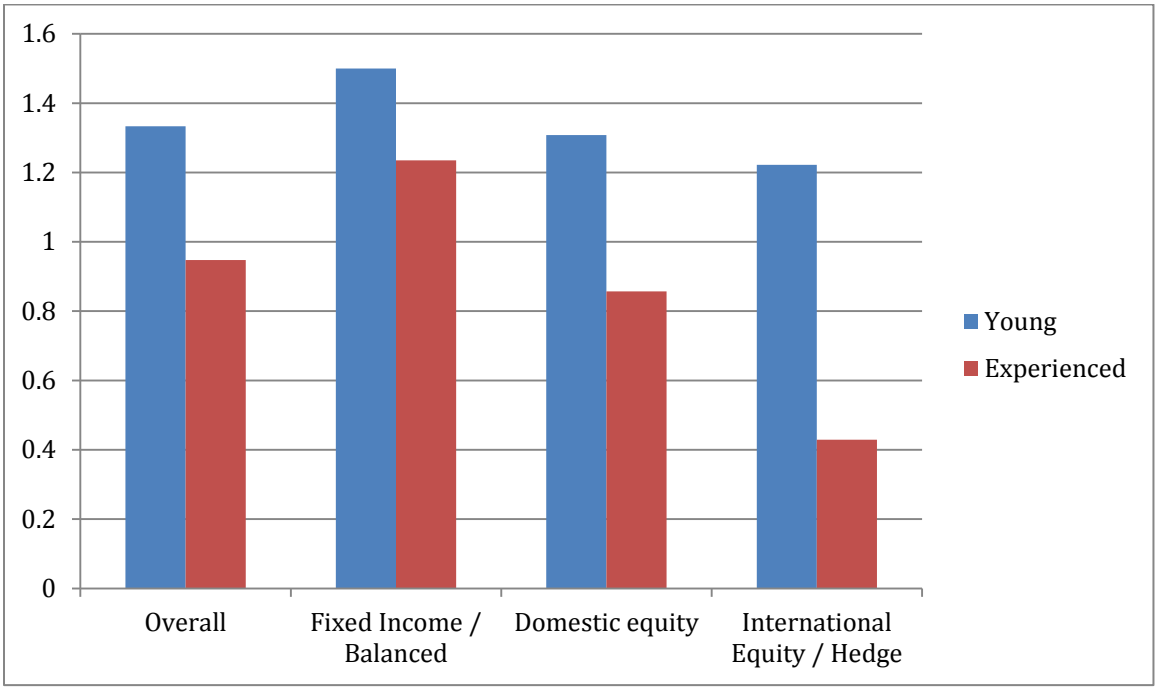
We report distribution of the estimates of managerial loss-aversion across mutual fund style categories. There are 25 Fixed Income / Balanced funds, 27 Domestic Equity funds, and 16 International Equity / Hedge funds.

Figure 2. Distribution of Managerial Risk Tolerance across Mutual Fund Style Categories



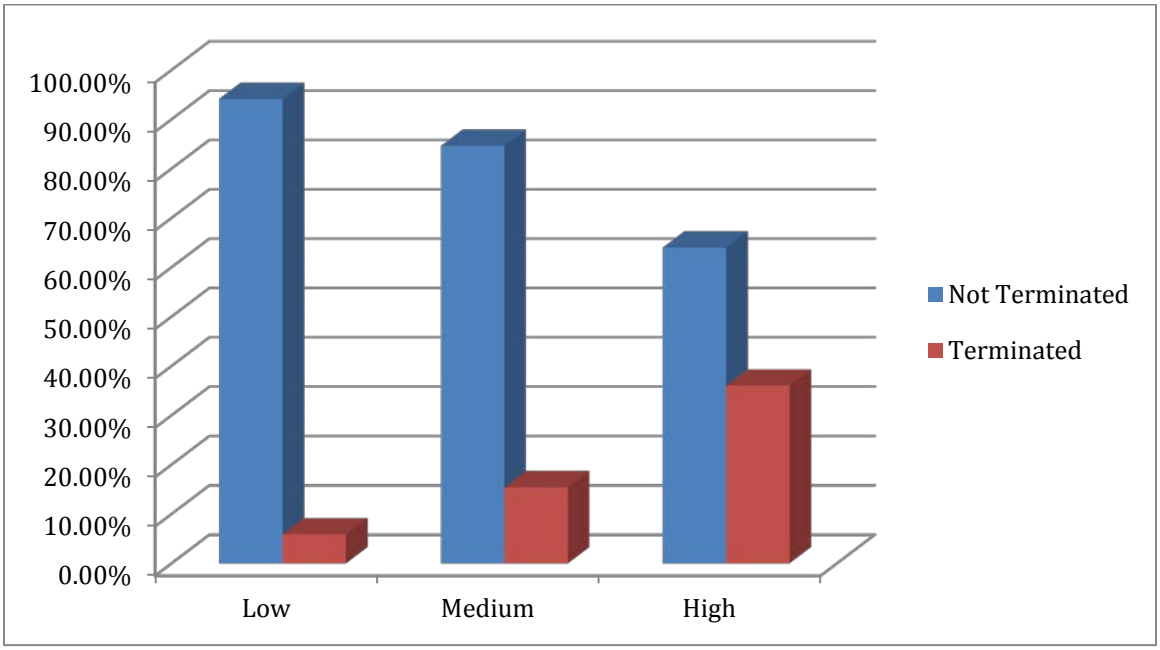
We report distribution of the estimates of managerial risk-tolerance across mutual fund style categories. There are 25 Fixed Income / Balanced funds, 27 Domestic Equity funds, and 16 International Equity / Hedge funds.

Figure 3. Distribution of Managerial Loss Aversion by Experience



We report distribution of loss-aversion by managerial experience. Manager is considered to be experienced if his or her age is above sample average (approximately 42 years) and young otherwise. Age is measured at the time of survey distribution (March of 2004).

Figure 4. Managerial Loss Aversion and Contract Termination



We report distribution of career outcomes across managerial loss loss-aversion categories (on horizontal axis). Manager is considered to have his contracted involuntarily terminated if he or she leaves the asset management industry, moves to a smaller fund by the end of our sample period, or leaves for personal reasons. The complementary group consists of managers remaining in their funds, moving to larger funds, retiring after reaching statutory retirement age.

Table 1. Managerial Loss Aversion across Mutual Fund Style Categories

In Panel A we provide distribution of managerial loss-aversion across mutual fund style categories. Panel B reports average (median) value of loss-aversion for each category and tests for the difference in loss-aversion between Fixed Income / Balanced and International Equity / Hedge Fund style categories. Loss-Aversion takes the value of 0 (1, 2) if manager falls into a low (middle, high) los-aversion category.

Panel A: Distribution of Loss-Aversion across MF Styles

Loss- Aversion	Fixed Income / Balanced	Domestic Equity	International Equity / Hedge	Total
Low (accept both lotteries)	5	6	6	17
Middle (reject A, not B)	7	13	6	26
High (reject both lotteris)	13	8	4	25
Total	25	27	16	

Panel B: Average Loss-Aversion across MF Styles

	Fixed Income / Balanced	Domestic Equity	International Equity / Hedge	Test (1-3)	p-value
mean	1.320	1.074	0.875	1.73	(0.10)
median	2.000	1.000	1.000	1.70	(0.09)

Table 2. Managerial Risk Tolerance across Mutual Fund Style Categories

In Panel A we provide distribution of managerial risk-tolerance across mutual fund style categories. Panel B reports average (median) value of risk-tolerance for each category and tests for the difference in loss-aversion between Fixed Income / Balanced and International Equity / Hedge Fund style categories. Risk Tolerance takes the value of 0.11 (0.36, 0.68, 1.61) if a managers falls into the lowest (second lowest, second highest, highest) risk-tolerance category (Barsky et al., 1997).

Panel A: Distribution of Risk Tolerance across MF Styles

	Fixed Income / Balanced	Domestic Equity	International Equity / Hedge	Total
Lowest (reject 1/5)	6	9	7	22
2nd lowest (accept 1/5, reject 1/3)	14	14	3	31
2nd highest (accept 1/3, reject 1/2)	4	2	5	11
Highest (accept ½)	1	2	1	4
	25	27	16	

Panel B: Average Risk Tolerance across MF Styles

	Fixed Income / Balanced	Domestic Equity	International Equity / Hedge	Test (1-3)	p-value
mean	0.401	0.393	0.429	0.25	(0.81)
median	0.360	0.360	0.360	0.14	(0.88)

Table 3. Managerial Attitudes toward Risk and Fund's Downside Risk: Downside Beta

We relate Loss-Aversion of fund's manager to fund's Downside Beta. Panel A reports the results of Fama-MacBeth regressions with Newey-West standard errors. Panel B reports the results of panel regressions with standard errors clustered at the manager level. Fixed effects are as indicated in the tables. All variables are described in Appendix 3.

Panel A: Fama-MacBeth

	estimate	t-stat	estimate	t-stat	estimate	t-stat	estimate	t-stat
Loss-aversion	-0.039	(-2.36)	-0.088	(-2.38)	-0.086	(-2.39)	-0.207	(-5.50)
Risk-tolerance					0.043	(0.94)	-0.121	(-2.96)
Beta	0.833	(23.23)	0.787	(6.63)	0.817	(7.13)		
Age	-0.003	(-1.66)	-0.006	(-8.25)	-0.006	(-4.92)	-0.019	(-3.62)
Gender	0.075	(1.67)	0.107	(1.13)	0.098	(1.20)	0.098	(3.75)
Log(Fund Size)	0.001	(0.25)	-0.002	(-0.16)	-0.003	(-0.23)	0.437	(1.84)
Past Year return	0.137	(0.49)	0.038	(0.13)	0.036	(0.14)	0.033	(0.42)
Style category dummies	No		Yes		Yes		Yes	
Fund Family dummies	No		Yes		Yes		Yes	
Adj R^2	0.827		0.8377		0.8375		0.3946	

Panel B: Pooled panel

	estimate	t-stat	estimate	t-stat	estimate	t-stat	estimate	t-stat
Loss-aversion	-0.041	(-2.05)	-0.036	(-1.88)	-0.037	(-1.77)	-0.225	(-3.20)
Risk-tolerance					0.005	(0.10)	-0.122	(-0.84)
Beta	0.864	(24.14)	0.934	(11.70)	0.934	(11.25)		
Age	-0.003	(-1.83)	-0.002	(-0.80)	-0.002	(-0.86)	-0.021	(-3.12)
Gender	0.060	(1.40)	0.081	(1.42)	0.083	(1.40)	0.559	(3.30)
Log(Fund Size)	0.005	(0.70)	0.004	(0.47)	0.004	(0.47)	0.058	(2.75)
Past Year return	-0.079	(-0.94)	-0.019	(-0.24)	-0.018	(-0.22)	-0.423	(-0.24)
Style category dummies	No		Yes		Yes		Yes	
Fund Family dummies	No		Yes		Yes		Yes	
Yearly dummies	Yes		Yes		Yes		Yes	
Clustering	Manager		Manager		Manager		Manager	
Adj R^2	0.9021		0.9058		0.9054		0.6512	

Table 4. Managerial Attitudes toward Risk and Fund's Downside Risk: Target Semi-Variance

We relate Loss-Aversion of fund's manager to fund's Target Semivariance. Panel A reports the results of Fama-MacBeth regressions with Newey-West standard errors. Panel B reports the results of panel regressions with standard errors clustered at the manager level. Fixed effects are as indicated in the tables. All variables are described in Appendix 3.

Panel A: Fama-MacBeth

	estimate	t-stat	estimate	t-stat	estimate	t-stat	estimate	t-stat
Loss-aversion	-0.059	(-2.34)	-0.130	(-2.34)	-0.100	(-1.78)	-0.228	(-2.36)
Risk-tolerance					-0.077	(-1.34)	-0.101	(-1.68)
Variance	0.392	(13.68)	0.315	(10.37)	0.321	(10.56)		
Age	-0.003	(-2.38)	-0.014	(-3.60)	-0.011	(-2.79)	-0.023	(-3.27)
Gender	-0.058	(-1.07)	-0.004	(-0.05)	-0.067	(-0.69)	0.421	(2.16)
Log(Fund Size)	-0.040	(-3.27)	-0.050	(-3.10)	-0.047	(-3.17)	-0.001	(-0.05)
Past Year return	-0.891	(-2.41)	-1.056	(-3.24)	-1.146	(-3.53)	-0.305	(-0.25)
Style category dummies	No		Yes		Yes		Yes	
Fund Family dummies	No		Yes		Yes		Yes	
Adj R^2	0.8615		0.8516		0.8426		0.3807	

Panel B: Pooled panel

	estimate	t-stat	estimate	t-stat	estimate	t-stat	estimate	t-stat
Loss-aversion	-0.067	(-1.70)	-0.080	(-1.89)	-0.075	(-1.75)	-0.280	(-2.46)
Risk-tolerance					-0.110	(-1.60)	0.161	(1.06)
Variance	0.388	(17.53)	0.376	(18.29)	0.381	(17.69)		
Age	-0.003	(-0.40)	-0.008	(-1.67)	-0.006	(-1.16)	-0.026	(-2.49)
Gender	-0.049	(-0.68)	-0.103	(-1.44)	-0.156	(-1.93)	0.802	(2.93)
Log(Fund Size)	-0.051	(-2.54)	-0.059	(-3.56)	-0.056	(-3.33)	0.044	(1.18)
Past Year return	-0.685	(-9.39)	-0.652	(-9.63)	-0.662	(-9.61)	-0.854	(-3.05)
Style category dummies	No		Yes		Yes		Yes	
Fund Family dummies	No		Yes		Yes		Yes	
Yearly dummies	Yes		Yes		Yes		Yes	
Clustering	Manager		Manager		Manager		Manager	
Adj R^2	0.8968		0.9172		0.9184		0.6067	

Table 5. Managerial Loss Aversion and Fund's Performance

We relate fund's downside risk to its performance. Measures of downside risk (Downside Beta and Target Semivariance) are instrumented with fund manager's loss aversion. The dependent variable is 2- (8-) factor adjusted monthly abnormal return on the fund's portfolio. Factors include excess return on domestic and world stock market indexes (four domestic and four world Fama-French and momentum factors). Factor loadings are estimated over the 3 years prior to the start of the current year. Panel A (B) reports the results for Downside Beta (Target Semivariance). Standard errors are clustered at the fund's level.

Panel A: Downside Beta and Fund's Performance

	8-factor adjusted returns				2-factor adjusted returns			
	estimate	t-stat	estimate	t-stat	estimate	t-stat	estimate	t-stat
β^- (Instrumented)	0.0110	(3.05)	0.0134	(3.45)	0.0240	(6.97)	0.0265	(7.10)
β^+	-0.0035	(-1.71)	-0.0033	(-1.64)	-0.0103	(-5.31)	-0.0085	(-4.49)
Age	0.0000	(0.50)	0.0001	(0.92)	0.0000	(0.11)	0.0001	(1.07)
Gender	-0.0064	(-2.77)	-0.0090	(-3.46)	-0.0057	(-2.55)	-0.0076	(-3.02)
Log(Fund size)	-0.0013	(-2.94)	-0.0013	(-2.93)	-0.0016	(-3.57)	-0.0013	(-3.01)
Past Year Return	-0.0002	(-0.05)	0.0012	(0.36)	-0.0034	(-1.06)	-0.0019	(-0.59)
Style dummies	No		Yes		No		Yes	
Fund Family dummies	No		Yes		Yes		Yes	
Yearly dummies	Yes		Yes		Yes		Yes	
	score	p-value	Score	p-value	score	p-value	score	p-value
Sargan Stat	3.90	0.14	2.07	0.35	1.15	0.28	0.25	0.62
F-test of excl inst	395.60	0.00	393.96	0.00	240.48	0.00	266.43	0.00

Panel B: Target Semivariance and Fund's Performance

	8-factor adjusted returns				2-factor adjusted returns			
	estimate	t-stat	estimate	t-stat	estimate	t-stat	estimate	t-stat
Target Semivar (Instr)	0.0098	(2.24)	0.0109	(1.90)	0.0226	(5.32)	0.0274	(4.92)
Upside Semivariance	-0.0069	(-2.66)	-0.0073	(-2.47)	-0.0142	(-5.65)	-0.0157	(-5.43)
Age	0.0000	(0.29)	0.0000	(0.38)	0.0000	(0.07)	0.0001	(0.98)
Gender	-0.0014	(-0.64)	-0.0014	(-0.55)	0.0017	(0.81)	0.0045	(1.81)
Log(Fund size)	-0.0002	(-0.48)	-0.0002	(-0.28)	0.0007	(1.62)	0.0013	(2.46)
Past Year Return	0.0078	(2.18)	0.0085	(2.05)	0.0101	(2.88)	0.0131	(3.20)
Style dummies	No		Yes		No		Yes	
Fund Family dummies	No		Yes		Yes		Yes	
Yearly dummies	Yes		Yes		Yes		Yes	
	score	p-value	Score	p-value	score	p-value	score	p-value
Sargan Stat	4.01	0.13	4.06	0.13	1.09	0.30	1.08	0.31
F-test of excl inst	144.83	0.00	88.09	0.00	87.66	0.00	43.10	0.00

Table 6. Managerial Loss Aversion and Experience

We explore the relation between managerial loss-aversion and managerial experience for the sample of our mutual fund managers. Manager is considered to be experienced if his or her age is above sample average (approximately 42 years) and young otherwise. Loss-Aversion takes the value of 0 (1, 2) if manager falls into a low (middle, high) los-aversion category. We report average values of loss-aversion across experience groups both for the overall sample and for mutual fund style categories.

	Overall	Fixed Income / Balanced	Domestic Equity	International Equity / Hedge
Young	1.3333	1.500	1.308	1.222
Experienced	0.9474	1.235	0.857	0.429
t-test	2.07	0.76	1.72	2.14
p-value	(0.05)	(0.46)	(0.10)	(0.06)
Wilcoxon	2.04	0.99	1.63	1.97
p-value	(0.05)	(0.32)	(0.10)	(0.05)

Table 7. Managerial Loss Aversion and Contract Termination

We investigate the effect of managerial loss-aversion on the likelihood of his or her contract being terminated involuntarily. Manager is considered to have his contracted involuntarily terminated if he or she leaves the asset management industry moves to a smaller fund by the end of our sample period, or departs for personal reasons. The complementary group consists of managers remaining in their funds, moving to larger funds, retiring after reaching statutory retirement age. Panel A reports the distribution of terminated and non-terminated managers (number and percentage) by loss-aversion categories. Panel B presents distribution of terminated managers across mutual fund style categories. Panel C reports marginal effects from probit regressions. The dependent variable takes the value of one is manager's contract is terminated and zero otherwise.

Panel A: Descriptive Statistics of Managerial Terminations

Loss-aversion	Terminated	Not-Terminated
Low	1 (5.88%))	16 (94.12%)
Medium	4 (15.38%)	22 (84.62%)
High	9 (36.00%)	16 (64.00%)
Overall	14 (20.59%)	54 (79.41%)

Panel B: Loss Aversion and Termination by Style Categories

	Fixed Income / Balanced			Domestic Equity			International Equity / Hedge Funds		
	N	N Terminated	Terminated %	N	N Terminated	Terminated %	N	N Terminated	Terminated %
Low (accept both lotteries)	5	0	0.00%	6	0	0.00%	6	1	16.67%
Middle (reject A, not B)	7	1	14.29%	13	1	7.69%	6	3	50.00%
High (reject both lotteries)	13	1	7.69%	8	2	25.00%	4	4	100.00%

Panel C: Probit Analysis

	ME	t-stat	ME	t-stat	M	t-stat
Loss aversion	0.2067	(3.17)	0.2127	(3.16)	0.1968	(2.90)
Risk Tolerance			0.0589	(0.45)	0.0555	(0.42)
Age	-0.0006	(-0.08)	-0.0011	(-0.16)	0.0003	(0.04)
Gender	0.0037	(0.03)	0.0090	(0.07)	-0.0321	(-0.23)
Style dummies	N		N		Y	
Fund family dummies	N		N		Y	
Pseudo R^2	0.177		0.180		0.209	