Historical Performance and Risk-Shifting In Mutual Funds

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Abstract

I document new evidence regarding the risk-shifting behavior of mutual fund managers. First I show that the historical fund performance influences fund-flow patterns as well as employment incentives for the managers. Second I show that the managerial risk-shifting in response to their midyear position is influenced by the historical performance. In addition, the direction of risk-shifting is consistent with the directions in which historical performance alters the incentives. The risk-shifting for the managers with excellent track record is driven primarily by the fund-flow incentives

JEL classification: G10, G11, G23.
Keywords: Mutual Funds, Risk-Shifting, Managerial Incentives

1 Introduction

I study the risk-taking or the risk-shifting behavior of the mutual fund managers in response to the multi-dimensional managerial incentives. On one hand, investors determine their mutual fund holdings given the fund's recent performance which, in turn, shapes the manager's compensation as often managers are compensated in the proportion of growth in the fund's assets. I term this as *compensation incentive.* On the other hand, manager's *employment incentives* arise from the fact that the fund company determines whether to continue the employment contract with the same manager or to terminate him given his performance. I empirically show that both these incentives are a function of the fund's historical performance and not just affected by the recent performance. Given this, I conjecture that the risk-taking behavior of the managers depends on their historical performance. For brevity, managers with a good (poor) historical performance are called *good-history* (poor-history) managers.

(Brown et al., 1996), using the data from 1985 to 1991, documents that a midyear losing manager increase the portfolio risk more than a midyear winning manager during the second

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half of the year, to catch up with the peers. (Kempf et al., 2009) document that risk-shifting behavior depends on whether the compensation incentives or the employment incentives dominate during a given year. I uncover a new channel namely the historical performance of the manager that has the explanatory power for the risk-taking behavior. Once I consider the past performance, I document a dramatic heterogeneity in the way managers respond to their midyear rank. None of the earlier papers have documented this heterogeneity in the risk-taking behavior.

(Javadekar, 2016) documents that the fund-flow level and the sensitivity both increases in the fund's historical performance. This fact implies that the *good-history managers* have an incentive to take the risk to capture the higher level of flows that accrue to them after a good performance. On the other hand, the poor-history managers face relatively insensitive fund-flows and to that extent, they are not motivated by the fund-flow incentives. Turning to the employment incentives, (Chevalier and Ellison, 1999) and (Khorana, 1996) both documents an inverse relationship between recent performance and the firing probability. Contrary to that, I document the dependence of managerial firing on the historical performance. First, I show that for any level of recent performance, the firing probability is decreasing in the historical performance. Second, I show that the traction of the recent performance on the firing probability becomes weaker with the historical performance. These two observations imply that the poor-history managers face a more severe unemployment risk, but at the same time they can increase the chances of employment continuation with a better recent performance. On the other hand, the good-history managers neither face significant unemployment risk nor can they alter the likelihood of firing by improving their yearly performance. In this sense, a good-history manager is not motivated by the employment incentives. In summary, we have that a good-history manager is primarily affected by the *compensation incentive* and a poor-history manager by the *employment incentives*.

Given that historical performance shapes the manager's incentives, his portfolio choice is highly likely to be influenced by his historical record. In the data, I exactly find this to be the case. First, a poor-history manager acts more risk-averse as compared to the good-history manager during both the bull and the bear periods. A good-history manager always engages in the risk-shifting. That is amongst the class of the good-history managers, the ratio of the portfolio risk of the second half to the first half of the year is more for a midyear loser than a midyear winner. The extent of this tendency is more pronounced during bull years as fund flow level is much higher during the bull periods. Note that the nature of the unemployment incentive is virtually unchanged across bull and bear periods for the good-history managers. Hence, the change in risk-shifting intensity across bull and bear periods can be attributed to the compensation or fund flow incentives. Second, a poor-history manager never engages in risk-shifting. During bull phases, he acts neutral in the sense that a midyear performance has no traction on the risk-shifting ratio. During the bear phases, given the extremely high unemployment risk, a poor-history manager infact enegages in the reverse risk-shifting. That is amongst the class of the poo-history managers, the ratio of the portfolio risk of the second half to the first half of the year is less for a midyear loser than a midyear winner. These findings are important in that they showcase the fact that manager's risk-taking behavior is linked to the basic incentives they face. Simple linear risk-shifting technology describes managerial behavior.

2 Literature Review

The focus of the risk-shifting literature has been on trying to understand how the managers change the portfolio risk during the second half of the year in response to their midyear position. The presence of fund flow incentives and employment incentives rationalize risk-shifting motive. (Chevalier and Ellison, 1997) and (Sirri and Tufano, 1998) both documents that the fund flow schedule is convex. (Carpenter, 2000) and (Chen, 2009) show that the midyear losing managers have an incentive to increase the risk during the second half of the year given these convex incentives. (Basak et al., 2007) show that managers shift the tracking error of the portfolio over a finite range of midyear performance, especially around the kink of the fund flow schedule. The empirical literature has given a mixed evidence at the best. (Brown et al., 1996) document that a midyear losing manager increases relative risk during the second half of the year. (Chevalier and Ellison, 1997) document that young managers are likely to adjust the risk in response to mid-year peer adjusted position. (Kempf et al., 2009) stresses the distinctive role of employment incentives and compensation incentives for managerial risk taking. They show that when employment (compensation) incentives dominate, then midyear losing managers reduce (increase) the risk during the second half of the year more than the midyear winning managers. (Hu et al., 2011) provides a model with U-shaped risk choice in midyear performance and find similar support in the data.

Motivated by the impact of the reputation on both types of managerial incentives, I propose conditioning of the risk-shifting results on the fund's historical performance.

3 Data and Variables

3.1 Data

I use CRSP Survivor-Bias-Free Mutual Fund Database, covering a period from 1999 to 2014 at an annual frequency. Sample selection is in line with the earlier literature. I focus on the US domestic open-ended equity funds. I exclude sector, index, and specialty funds. Because names or styles may not reflect the actual nature of the fund, I also exclude funds whose mean equity holdings are less than 70%. I rule out any funds where size is smaller than 15 million USD and also any fund whose age is three years or less. Many funds offer multiple share classes to represent various categories of investors or types of distribution used to market the fund. Following the earlier literature, I aggregate all the share classes belonging to one fund. The size of the fund is the sum of sizes of all the share classes, and fund age is the age of the oldest share class. Other variables like turnover, expense ratio, returns, etc. are computed on size-weighted average basis.

I use daily fund returns data which is available starting from 1999. For each fund, I compute daily excess return over the mean daily return of the investment category to which that fund belongs. Then $\sigma(r_{it,k} - b_{t,k})$ is just the standard deviation of these excess return computed for $k = 1, 2$.

3.2 Splitting The Sample

Following (Kempf et al., 2009), I split the sample according to whether the midyear stock market return is positive or negative. For this purpose, I use CRSP's value-weighted stock market index. I label the years with negative (positive) midyear stock market return as bear (bull) years. The basic conjecture is that the compensation (employment) incentives dominate during bull (bear) years. Market returns proxies the state of the industry to a good extent. Aggregate capital flows are low following a bear market (Karceski, 2002). That is during the bear markets, a manager can attract not a great deal of new capital flow even with a good performance. Manager's compensation depends on the size of the fund which does not grow drastically during the bear markets. Also, bonus payments are linked to the profitability of the fund family (?) which is low during the bear markets. In this sense, the compensation incentives are weaker during bear years. On the contrary, firing probability is higher during bear markets (Chevalier and Ellison, 1999). Therefore, employment incentives are stronger during bear markets. It is easy to see that the compensation incentives are more important during bull markets by reversing the arguments above.

3.3 Risk-Shifting Measure

It is important to fix on the notion of the risk before computing risk-shifting. For example, if an active fund benchmarks his portfolio completely, then his portfolio volatility is equal to the market volatility. If market volatility goes up during the second half of the year, then manager's portfolio volatility goes up as well. If the measure of risk is raw volatility of portfolio return, then the risk seems to have been shifted. But from a strategic perspective, portfolio benchmarking is unchanged. Which measure of risk is more appropriate? Because managers adjust the risk to outperform, the answer to the question depends on what notion of outperformance they are targeting. Fund companies evaluate managers in comparison to the pre-defined benchmark. On the other hand, the empirical evidence shows that investor assesses the manager based upon risk-adjusted or peer adjusted performance (Berk and Van Binsbergen, 2014). Given this, the appropriate notion of the risk-shifting is the extent to which the portfolio is similar to the portfolio of peers or appropriate benchmark. One quick way to measure how similar the portfolio was is to compute the volatility the fund returns are around mean returns of the peers.

Using this background and following (Kempf et al., 2009) and (Brown et al., 1996), I construct the first measure of risk-shifting as follows

$$RSR_{it} = \frac{\sigma(r_{it,2} - b_{t,2})}{\sigma(r_{it,1} - b_{t,1})} \tag{1}$$

where $r_{it,k} - b_{t,k}$ indicates the excess fund return over the benchmark during k^{th} half of the year. For my measure, $b_{t,k}$ is the mean return over all the funds belonging to similar investment objective during k^{th} half of the year t.

4 Dependence of Incentives on Historical Performance

4.1 Unemployment Incentives

Table 1 presents the evidence about firing probabilities as a function of the recent performance and historical performance. I perform the analysis for the bear and the bull periods separately. Panel A shows the firing incidences for the bear years, and Panel B shows it for thebull years. First, a poor-history manager faces a severe risk of getting replaced after a recent poor performance. The probabilities are 8.37% and 14.48% during bull and bear years respectively. These are economically large probabilities in absolute terms as well as relative to the corresponding firing probabilities for a good-history manager which are almost a third in magnitude for a similar recent performance. Second, the table shows that firing probabilities drop significantly with recent performance for a poor-history manager. For example, if a poor-history manager ranks within top third during the current period then the probability is reduced to mere 2.53%, down from 14.48% during the bear years. But same is not true for a good-history manager. Firing probabilities hardly vary across the range of the current performance. These two observations show that poor-history managers are affected by the employment risk and recent performance can help them reduce the risk. On the other hand, a good-history manager is not very much concerned about the unemployment risk for two reasons: one is that the probability of firing is low in absolute terms, and he can't reduce it with a better recent performance. [1]

4.2 Compensation Incentives

Fund-flows drive compensation incentives to a large extent for the mutual fund managers. Evidence on *Return chasing* on the part of the mutual fund investors is well documented by (Ippolito, 1992), (Chevalier and Ellison, 1997), and (Sirri and Tufano, 1998), among others. But (Javadekar, 2016) finds that the pattern of fund flows is determined primarily by the interaction between recent and historical fund performance. Table 4 reproduces the main findings of that paper. The first model in Panel A regresses flows on the current performance without considering the historical performance. The positive coefficient on the recent performance variable indicates return chasing. In the second column of Panel A, I include the interaction between the recent and the historical performance. First, the impact of the return chasing is drastically weaker. Coefficient reduces from 0.35 to 0.16, a drop of more than 50%. Second, the coefficient on the interaction term equals 0.29. It is statistically and economically large. In fact, it is bigger than the coefficient of the recent performance. The evidence shows how the historical performance determines the sensitivity of fund flows. In particular, the fund flows are sensitive for the managers with high historical rank. In panel B, I repeat the regressions with a split sample. The results are valid across bull and bear years. Therefore, the results indicate that a poor-history manager has relatively weaker incentive to improve the performance to attract new capital. This finding is valid across various market states.

[1]Some of the good-history managers might leave the fund voluntarily for a bigger contract after one more good performance. This might account for higher replacement probabilities at the top end of recent performance for a good-history manager.

5 Hypothesis Development

The basic logic behind the following hypothesis is that the good-history managers are driven by the compensation incentives while the poor-history managers are driven primarily by the employment incentives.

Hypothesis 1 *The extent to which a midyear loser increases the risk relative a midyear winner fund is more for the category of the good-history managers than for the category of the poor-history managers. Formally, for* $r_1 > r_2$

$$RSR_{good,t}(r_2) - RSR_{good,t}(r_1) > RSR_{poor,t}(r_2) - RSR_{poor,t}(r_1)$$

where r_1 *and* r_2 *indicate the level of midyear performance.*

This hypothesis conjectures that a good-history manager has more appetite to shift the risk up during the year in response to his weak midyear performance as compared to a poor-history manager. There are two channels at work here. First, during any market state, a good-history manager is relatively less concerned about the unemployment risk. At the same time, for a good-history manager, the level, the sensitivity and the convexity of flow-schedule is higher relative to a poor-history manager. Both these channels lead to the unambiguous conclusion that for a given weak midyear performance, a good-history manager would deviate more from the benchmark portfolio as compared to a poor-history manager.

Hypothesis 2 *For any type of manager, the extent of risk-shifting given a midyear losing position is lower during the bear years than the bull years. Formally, for* $r_1 > r_2$

$$[RSR_{i,t}(r_2) - RSR_{i,t}(r_1)]_{bull} > [RSR_{i,t}(r_2) - RSR_{i,t}(r_1)_{bear}$$

where r_1 *and* r_2 *indicate the level of midyear performance.*

This follows because unemployment risk increases during the bear markets. Even for a good-history manager, it increases relative to the bull years.

Hypothesis 3 *The difference in risk-shifting ratio between good-history and poor-history manager widens during bear years as compared to the bull years. Formally, for any* r_1,

$$[RSR_{good,bear}(r_1)] - RSR_{poor,bear}(r_1)] > [RSR_{good,bull}(r_1)] - RSR_{poor,bull}(r_1)]$$

The rise in the unemployment risk is more dramatic for the poor-history managers during the bear years. The flow-schedule is invariant in terms of how flows react to the recent performance across the bear and the bull phases. This suggests that the poor-history managers would become relatively more risk-averse during the bear phases as compared to the bull phases, widening the difference in the risk-shifting ratio between the good-history and the poor-history managers.

6 Results

6.1 Contingency Tables

I present the primary results using traditional 2×2 contingency tables using the midyear performance and the risk-shifting ratio as two dimensions. Each fund with below (above) median midyear performance is classified as midyear loser (midyear winner). Similarly, a fund with below (above) median risk-shifting ratio is classified as having low (high) RSR. The median for both the variables is computed over all the funds following a particular investment category. I additionally sort the funds using its historical performance. To this end, I consider last year's performance as a historical record. A fund is called good-history (bad-history) if its performance ranked amongst top (bottom) 20% of the funds within their investment segment during last year.

The evidence is presented in the table 2. The panel shows the results for the bull years and the panel B for the bear years. First, comparing sub-panel a with b and d with e, we see that a midyear loser is more likely to have a low RSR if belonging to the class of poor-history managers. During the bull years, 53.60% of the midyear losers have below median RSR within the class of poor-history managers as compared to 47.93% for the class of good-history managers. The numbers are 57.17% and 50.87% respectively for the bear years. Next, comparing the bear and bull numbers for the same class of managers, we see that a more fraction of midyear losing managers has lower RSR during bear years. The numbers are 53.60% and 57.17% for bull and bear years for the poor-history managers and 47.93% and 50.87% for the good-history managers. Third, comparing the absolute fractions, we see that the poor-history midyear losers are always more likely to act risk-averse. Within the class of the poor-history managers, during both the bear and the bull years, more than half of the midyear losers have lower RSR. On the other hand, good-history managers act as risk-takers during bull years.

Note that when we do not condition on the historical performance, both the extent and the direction of the risk-shifting behavior becomes obscure to understand. Evidence in sub-panel c and f suggests that during the bull years, midyear losers are more likely to have high risk-shifting ratio (51.70% as against 48.20%), but during bear years the reverse is true. During bear years, midyear losers are less likely to have higher risk-shifting ratio (48.06% as against 51.89%). This evidence is consistent with (Kempf et al., 2009) who were the first to point out that the risk-shifting behavior is different during the bear and the bull years. The contribution of this paper is to show that there is one more level of heterogeneity that is masked behind these numbers.

6.2 Regression

I test the hypothesis using regression approach in this section. In particular, I estimate the following regression model for the bear and the bull years separately.

$$\begin{aligned} RSR_{it} &= \beta_0 + \beta_1 \times (r_{it,1} - b_{t,1}) + \beta_2 \times \text{Rank}(r_{it-1} - b_{t-1}) \\ &\quad + \beta_3[(r_{it,1} - b_{t,1}) \times \text{Rank}(r_{it-1} - b_{t-1})] + Controls_{it} + \varepsilon_{it} \end{aligned}$$

where $r_{it,k} - b_{t,k}$ denotes the benchmark-adjusted fund performance during the k^{th} half of the year and $r_{it} - b_t$ denotes the benchmark-adjusted fund performance for the full year t. Rank(x) denotes the normalized rank of the fund when sorted by variable x that lie between 0 and 1. The estimates are presented in table 3. The panel A estimates the equation without considering the historical performance while the Panel B include historical performance and its interaction with the midyear performance. Column head indicates the state of the market (bull or bear).

First, consider panel A. The results are consistent with (Kempf et al., 2009). The coefficient on the midyear performance is negative for the bull years, and it is positive for the bear years. A negative coefficient suggests that the risk-shifting ratio (RSR_{it}) is decreasing in the midyear performance; a midyear loser increases the risk more than a midyear winner. (Kempf et al., 2009) argues that compensation incentives dominate during the bull years which leads to risk-shifting by midyear losers to catch up with the peers and get additional capital. But during the bear years, unemployment risk shoots up. Therefore, a midyear loser is more averse to shift the risk up as compared to a midyear winner, leading to a positive coefficient on midyear performance. These are the findings without considering the historical performance.

In the panel B, I include the historical performance along with the midyear performance. Hypothesis 1 implies that β_3 is negative. Hypothesis 2 implies twin conditions: β_1(bear) > β_1(bull) for the poor-history managers and $[\beta_1 + \beta_3]$(bear) > $[\beta_1 + \beta)3]$(bull). Hypothesis 3 implies that $[\beta_1 - \beta_3]$(bear) > $[\beta_1 - \beta_3]$(bull). From the table we see that, all the conjectures or hypothesis are confirmed. A poor-history manager has a lower RSR during any given market state. Any given manager is more risk-averse in the bear phase and that the heterogeneity in risk-shifting widens during the bear phase across the good-history and the poor-history managers. Analyzing the absolute values of coefficients we see that, the coefficient on $Perf_{it,1}$ is always non-negative indicating that only the midyear performance does not induce risk-shifting on the part of the midyear losers. It's only for the good-history managers that a weak midyear performance causes positive risk-shifting. The fact that $[\beta_1 + \beta_3]$ is negative for both the phases confirms the fact.

7 Conclusion

The paper analyzes the risk-shifting behavior of the mutual fund managers and finds that the historical performance matters in the determination of the risk-shifting patterns. This dependence comes from the fact that the managerial incentives are dependent on the historical performance. Paper documents the dependence of unemployment incentives on the past performance. Next, the paper shows that the conjectured behavior is valid in the data. In particular, the poor-history managers are more averse to increase the risk in response to midyear performance. Moreover, managers, in general, are more reluctant to shift the risk up during the bear phases. Additionally, I find the cross-sectional variation in risk-shifting is higher during the bear phases. The difference mostly comes from the fact that the poor-history managers turn dramatically risk-averse mainly due to the corresponding disproportionate increase in the unemployment risk for these managers during the bear phase. In terms of the contribution, this paper shows that risk-shifting behavior can be explained without non-linear models once we condition on the historical performance of the fund.

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Table 1: Performance and Probability of Firing

$(r_{it-1} - b_{t-1}) \rightarrow$	Poor History (t-1)			Good History (t-1)		
$(r_{it} - b_t) \rightarrow$	Poor	Med	Top	Poor	Med	Top
			Bear Years			
Not Fired						
N	124	446	231	334	1,054	381
%	85.517	91.206	97.468	94.084	95.126	95.012
Fired						
N	21	43	6	21	54	20
%	14.482	8.793	2.531	5.915	4.873	4.987
			Bull Years			
Not Fired						
N	328	1,056	391	568	1,647	639
%	91.620	94.369	96.543	96.928	96.259	97.856
Fired						
N	30	63	14	18	64	14
%	8.379	5.630	3.456	3.071	3.740	2.143

Table 2: Contingency Table For Risk-Shifting

Panel A: Bull Years

	Poor-History (a)		Good-History (b)		Full Sample **c**	
	Midyear Loser	Midyear Winner	Midyear Loser	Midyear Winner	Midyear Loser	Midyear Winner
Low RAR (N)	439	433	728	860	2022	2164
%	53.60	52.36	47.93	54.16	48.30	51.80
High RAR (N)	380	394	791	728	2164	2014
%	46.40	47.64	52.07	45.84	51.70	48.20
Column Total	819	827	1519	1588	4186	4178
Chi2	0.26		12.06		10.19	
p-value	0.61		0.00		0.00	

Panel B: Bear Years

	Poor-History (d)		Good-History (e)		Full Sample (f)	
	Midyear Loser	Midyear Winner	Midyear Loser	Midyear Winner	Midyear Loser	Midyear Winner
Low RAR (N)	319	177	349	460	1153	1067
%	57.17	52.99	50.87	50.94	51.94	48.11
High RAR (N)	239	157	337	443	1067	1151
%	42.83	47.01	49.13	49.06	48.06	51.89
Column Total	558	334	686	903	2220	2218
Chi2	1.47		0.00		6.51	
p-value	0.23		0.98		0.01	

Table 3: Midyear Risk-Shifting By Fund Managers

The table presents the evidence on managerial risk-shifting. The dependent variable is midyear risk-shifting. Panel A regresses risk-shifting measure on midyear performance without the interactions with historical performance. Panel B considers the interaction between midyear performance and the historical performance. $\text{Perf}_{i,1t}$ denotes the peer-adjusted performance of the fund in the first half of the year t and repute_{it-1} indicates the historical performance of that fund at the start of the year t. Bull (Bear) denotes the years when midyear stock market return is positive (negative). All the regressions have time and fund investment category fixed effects. Standard errors are clustered at share class level.

	Panel A		Panel B	
	Bull	Bear	Bull	Bear
$\text{Perf}_{i1,t}$	-0.351***	0.253***	-0.118	0.776***
	(0.082)	(0.079)	(0.131)	(0.146)
$\text{repute}_{i,t-1}$			-0.021**	0.013
			(0.011)	(0.014)
$\text{Perf}_{i1,t}\times$ $\text{repute}_{i,t-1}$			-0.512**	-1.052***
			(0.228)	(0.251)
Log Size (t-1)	-0.003	0.008***	-0.002	0.007***
	(0.002)	(0.003)	(0.002)	(0.003)
Expense Ratio (t-1)	-0.717	1.205	-0.765	1.164
	(0.527)	(0.885)	(0.526)	(0.879)
Log Age (t-1)	0.003	-0.014*	0.003	-0.013*
	(0.006)	(0.008)	(0.006)	(0.008)
Intercept	1.027***	0.947***	1.038***	0.944***
	(0.020)	(0.031)	(0.021)	(0.032)
N	6465	3704	6465	3704
Adj. R-sq	0.595	0.603	0.595	0.605

Table 4: Historical Performance and Fund Flows

The table presents the regression of fund flows at time $t+1$ on the performance at time t given by Rank($r_{it} - b_t$) and the performance at the time $t-1$ given by Rank($r_{it-1} - b_{t-1}$). Ranks are normalized to lie between 0 and 1. History and No History indicate whether the regression model has interaction effect of the historical performance. Control variables include age, size, and expense ratio. All the models have time and style fixed effects. Standard errors are clustered at the fund level.

	Panel A: Full Sample		Panel B: State-Dependent	
			Bull Years	Bear Years
Rank($r_{it} - b_t$)	0.357***	0.164***	0.150***	0.189***
	(0.015)	(0.027)	(0.031)	(0.042)
Rank($r_{it-1} - b_{t-1}$)		0.061***	0.071***	0.046
		(0.021)	(0.027)	(0.031)
Rank($r_{it} - b_t$)× Rank($r_{it-1} - b_{t-1}$)		0.291***	0.273***	0.315***
		(0.047)	(0.058)	(0.075)
Log Size (t)	-0.018***	-0.027***	-0.026***	-0.027***
	(0.002)	(0.003)	(0.003)	(0.004)
Expense Ratio (t)	-0.496	-0.678	-0.406	-0.985
	(0.806)	(0.808)	(0.881)	(1.268)
Log Age (t)	-0.045***	-0.014**	-0.015*	-0.011
	(0.007)	(0.007)	(0.008)	(0.009)
Intercept	0.067*	0.042	0.061	0.002
	(0.035)	(0.035)	(0.039)	(0.052)
N	10169	8747	5327	3420
adj. R-sq	0.125	0.143	0.127	0.162