

Behind the Scenes of Mutual Fund Alpha

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This study examines whether fund alpha exists and whether it comes from manager skill. We found that the probability and the value of fund alpha vary depending on market states and fund styles. Overall, the funds with earned alpha do not exhibit a market-timing ability, though some of them show an ability to select stocks. We also used a sample of bootstrapped funds as the benchmark for funds without skill to explore the topic. Our test results suggest that fund alpha is resulted from pure luck instead of manager skill.

INTRODUCTION

Fund alpha and its sources are two important topics in mutual fund research. Research on the former relates to whether fund alpha exists, while that on the latter is about where fund alpha comes from. Answers to these two inquiries not only help investors make wise investment decisions between actively managed funds and low-cost passively managed funds but also provide insightful thoughts on fund management compensation. In this study, we examined three issues in fund performance. First, we examine whether some funds can really earn alpha in real life. Second, we ask, if fund alpha exists, from where does it come? In other words, is fund alpha due to market-timing skill, stock-selection skill, or pure luck? Third, we examine whether fund alpha is a reliable indicator of manager skill, in both the short run and the long run.

Henriksson (1984), Sharpe (1991), Fama and French (1993), Malkiel (1995), and Carhart (1997) have concluded that trying to beat the market through active investing is futile. French (2008) also found that a typical investor would be better off to switch to a passive market portfolio. On the other hand, Ibbotson and Patel (2002) concluded that superior fund performance does exist and that it repeats, even after adjusting for the investment style. Ding and Wermers (2009) also reported outperformance for both large-fund and small-fund managers.

As to the sources of fund alpha, Chevalier and Ellison (1999) found that fund managers who have attended higher-SAT undergraduate institutions earn higher risk-adjusted returns. Berk and Binsbergen (2014) found that manager skill exists and is persistent. Kosowski, Timmermann, Wermers, and White (2006) found that a sizable minority of managers picks stocks well enough to more than cover their costs, and the superior alphas of these managers persist. Baker, Litov, Wachter, and Wurgler (2010) concluded that mutual fund managers are able to trade profitably in part because they are able to forecast earnings-related fundamentals.

A closely related issue is whether fund managers have the ability to time the market return. Overall, the literature suggests that fund managers have poor timing ability and poor overall performance. For example, Treynor and Mauzy (1966), Henriksson and Merton (1981), Chang and Lewellen (1984),

Henriksson (1984), Chen and Stockum (1986), Chen, Lee, Rahman, and Chan (1992), Elton, Gruber, Das, and Blake (2011), and Becker, Ferson, Myers, and Schill (1999) found that the average market-timing performance of mutual funds is insignificant and sometimes even negative. Friesen and Sapp (2007) and Elton, Gruber, and Blake (2011) found no market-timing ability either. On the other hand, Kon (1979), Lehmann and Modest (1987), Lee and Rahman (1990), Grinblatt and Titman (1994), Daniel, Grinblatt, Titman, and Wermers (1997), Kaplan and Sensov (2005), and Jiang, Yao, and Yu (2007) found that mutual funds exhibit significant timing ability. Kacperczyk, Van Nieuwerburgh, and Veldkamp (2011) concluded that fund managers have stock-selecting skill in booms and market-timing skills in recessions.

CONTRIBUTIONS OF THE STUDY

In light of the prior research, our study sheds new light on the topics. First, controlling for market states, we estimate the alpha of each and every fund to see whether some funds can actually earn alpha. We also check the styles of the winner funds and the loser funds to determine if fund style matters in the occurrence of fund alpha.¹

Second, we investigate the market-timing ability of the winner funds and the loser funds. If winner funds demonstrate a market-timing ability, there are three possible sources of alpha, including market-timing skill, stock-selection skill, and pure luck. If not, fund alpha would come from either stock-selecting skill or pure luck. This test has not been conducted in prior literature. Kosowski et al. (2006) used independent simulations to form the distribution of alphas, assuming no outperformance. Fama and French (2009) used a similar method to assess manager skill. Since bootstrapped funds are generated out of pure luck, their performance can be used as the benchmark for no-skill performance.

To separate manager skill from pure luck, we also use a group of bootstrapped funds in this study as the benchmark for pure luck. Unlike the aforementioned researchers, we make no assumption regarding the return of the bootstrapped funds. If some bootstrapped funds earn alpha, and the bootstrapped winner funds also exhibit market-timing and stock selectivity, then fund alpha is not considered equivalent to manager skill.

Moreover, we introduce a new model to explore the sources of fund alpha. Since fund alpha results from the market exposures of a fund, we use the loadings on the four market factors in Carhart's (1997) four-factor model as a proxy for manager skill. In this model, fund alpha is used as the dependent variable, and the loadings on the market excess return, the size factor, the style factor, and the momentum factor are the independent variables. This model enables us to compare the sources of fund alpha between the actual winner/loser funds and the bootstrapped winner/loser funds. If the two fund groups exhibit similar loadings on the four independent variables with similar statistical significance, we can say that fund alpha comes from pure luck rather than manager skill, and vice versa.

Finally, since our sample period includes several up and down markets, we can compare the actual winner/loser funds with the bootstrapped winner/loser funds while controlling for market states. Specifically, we use a fixed-effects model to test whether fund alpha is dependent on market states and whether it is transient or persistent.

DATA AND METHODOLOGY

Our sample period spans from January 1998 to December 2012. To capture the dynamics of the market, the sample period is divided into five 3-year windows, including an up market from 1998 to 2000, a down market from 2001 to 2003, an up market from 2004 to 2006, a down market from 2007 to 2009, and a down market from 2010 to 2012. We use 15 annual Morningstar Principia discs to cover the entire sample period.² Our fund sample is based on domestic equity funds, and fund-level data are used in the study. The index funds, the specialty funds, and the hybrid funds are excluded from the fund sample.

Our methodology consists of three pillars. To test whether some funds have the ability to earn alpha, we use Carhart's (1997) four-factor model to estimate the alpha of every domestic equity fund in each of the five windows, then we divide funds with alpha statistically significant at 5% into two groups in each

window. Funds with positive alpha are grouped as the winner funds while those with negative alpha are the loser funds.

To test the return gap between the winner funds and the loser funds, we use Henriksson and Merton's (1981) return-timing model to examine whether the difference is due to an ability to time the market and/or to select stocks. If the winner funds demonstrate any market-timing and/or stock-selecting ability not possessed by the loser funds, then at least part of the fund alpha can be attributed to manager skill. However, if none of the funds exhibit such ability, pure luck cannot be excluded as one of the possible sources for fund alpha.

To separate manager skill from pure luck, we use a bootstrapping technique to randomly select a fund in each month from the actual fund sample while keeping the chronological order to get a bootstrapped fund; we repeat this procedure many times to get a large enough bootstrapped fund sample. Any return generated by the bootstrapped funds would have to come from pure luck. Based on this benchmark for pure luck, we conduct the same tests as those done for the actual funds. That is, we estimate the alpha of each bootstrapped fund in the five windows in the sample period, divide funds with statistically significant alpha into bootstrapped winner/loser funds, and test whether these funds have an ability to time the market and/or to select stocks. A comparison between the actual winner/loser funds and the bootstrapped winner/loser funds provides important information on the relation among fund alpha, manager skill, and pure luck.

EMPIRICAL FINDINGS

Fund Summary Statistics

Table 1 presents the descriptive statistics of the winner funds and the loser funds at the end of each three-year window. The statistics include the number of funds, the number of the winner/loser funds, the percentage of the winner/loser funds out of the fund sample, the average values of the fund size, the expense ratio, the turnover ratio, the cash ratio, the price to earnings ratio (PE), and the manager tenure.³ We use the Carhart (1997) four-factor model to estimate a fund's alpha. The basic structure of the model is as follows:

$$r_{p,t} = \alpha_p + \sum_{i=1}^N \beta_i r_{i,t} + \varepsilon_{p,t} \quad (1)$$

Where α_p is the intercept of the model and β_i is the loading on the monthly market excess return, the size factor, the style factor, and the momentum factor.

Panel A of Table 1 shows that the outperforming probability ranges from 1.2% in the 2001–2003 down market to 11.5% in the 1998–2000 up market.⁴ Comparing the outperforming probability across the five windows, we see that funds have a better chance of beating the market in an up market. On the other hand, there is no pattern in the underperforming probability across market states. According to Panel B of Table 1, the underperforming probability ranges from 3.63% in the 1998–2000 up market to 21.50% in the 2001–2003 down market.

In terms of fund size, the loser funds are overall smaller than the winner funds; the only exception occurs in the 2004–2006 up market. Moreover, the winner funds on average have a lower expense ratio and a lower turnover ratio, indicating that higher fund expense does not translate into a higher probability of earning alpha. As for turnover, we can see that the winner funds have much lower turnover than the loser funds in the 1998–2000 up market, the 2001–2003 down market, and the 2004–2006 up market. There is no difference in turnover between winner/loser funds in the other two windows. As to the liquidity position, we do not see any evident difference in liquidity position between the two fund groups, and there is no detectable difference in the price to earnings (PE) ratio between them either. In regard to manager tenure, Table 1 shows that the winner funds on average have longer tenure than the loser funds in all of the five windows.

TABLE 1
SUMMARY STATISTICS OF THE WINNER AND THE LOSER FUNDS

Period	Market State	Total Obs.	Winners /Losers	Pct	Size (\$million)	Expense (%)	Turnover (%)	Cash (%)	PE	Manager Tenure
Panel A: Winner Funds										
1998-2000	Up	1,680	193	11.50%	2650	0.94	77.69	5.31	28.05	6.60
2001-2003	Down	2,214	26	1.20%	1,348.85	1.23	78.04	10.70	16.50	5.66
2004-2006	Up	2,329	78	3.35%	901.38	1.29	76.63	3.18	19.47	4.53
2007-2009	Down	2,448	34	1.39%	1754.59	1.07	129.21	3.68	18.90	6.99
2010-2012	Up	2,229	52	2.33%	1650.58	0.97	92.69	7.70	15.81	8.88
Panel A: Loser Funds										
1998-2000	Up	1,680	61	3.63%	575.82	1.45	167.77	6.95	32.38	3.97
2001-2003	Down	2,214	476	21.50%	434.66	1.33	137.54	3.72	21.07	3.68
2004-2006	Up	2,329	161	6.91%	1446.25	1.06	79.07	3.62	18.68	4.47
2007-2009	Down	2,448	179	7.31%	403.32	1.13	117.91	5.01	15.26	4.12
2010-2012	Up	2,229	197	8.84%	618.82	1.22	94.18	4.37	15.51	6.57

Figure 1 shows the number of the winner/loser funds by style. We see that the large-blend funds, the large-value funds, and the large-growth funds are the top three winner funds, while the small-value funds have the lowest presence in the winner group. On the other hand, the large-blend funds, the large-growth funds, and the large-value funds also represent the top three loser fund groups, and the small-blend funds also have the lowest number of loser funds.

FIGURE 1
THE WINNER FUNDS AND THE LOSER FUNDS BY STYLE

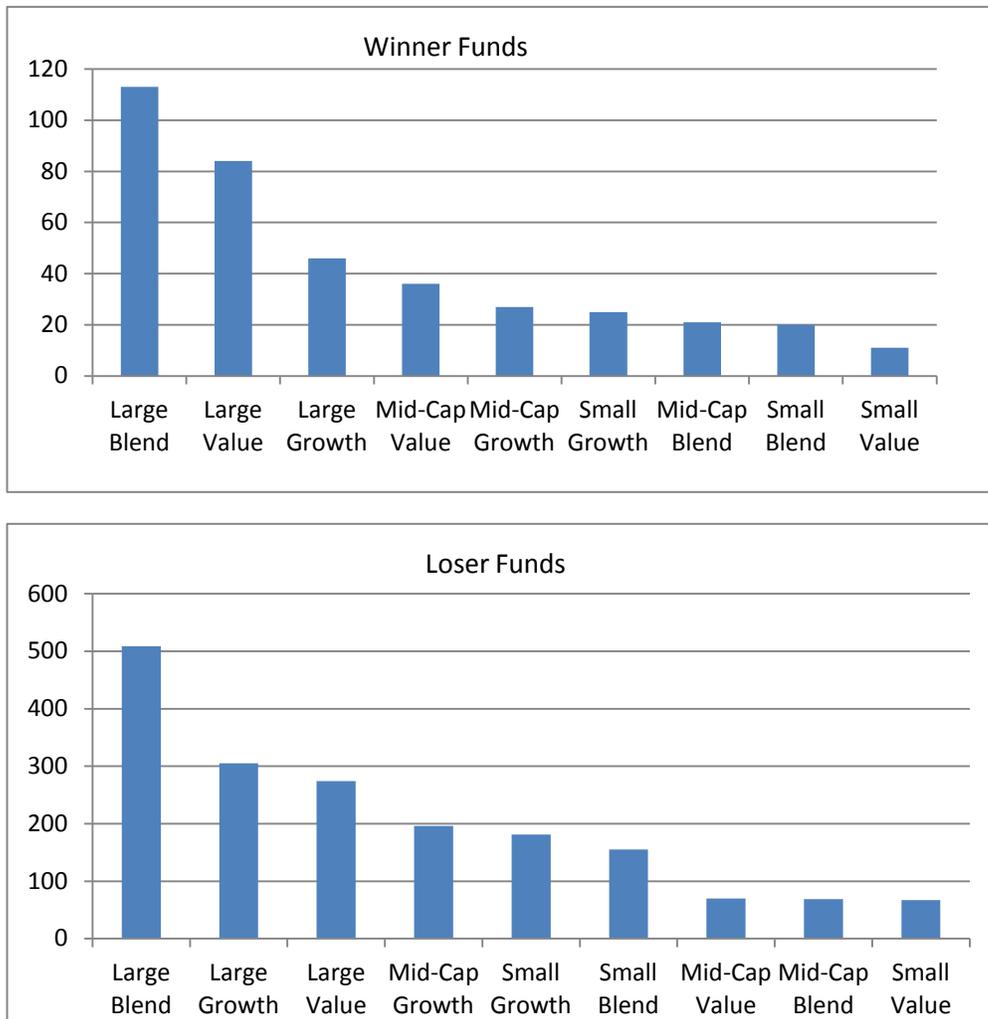


Figure 2 exhibits the percentages of the outperforming/underperforming probabilities across fund styles. We see that the mid-value funds have a 4.7% chance of outperformance, followed by the large-value funds and the large-blend funds, with outperforming probabilities of 4% and 3.4%, respectively. On the other hand, the average underperforming percentage of the loser funds is much higher. For example, the mid-growth funds have the highest underperforming percentage of around 26%, and even the lowest underperforming probability of the mid-growth funds is as high as 6%.

FIGURE 2
THE WINNER FUND AND THE LOSER FUND PERCENTAGES BY STYLE

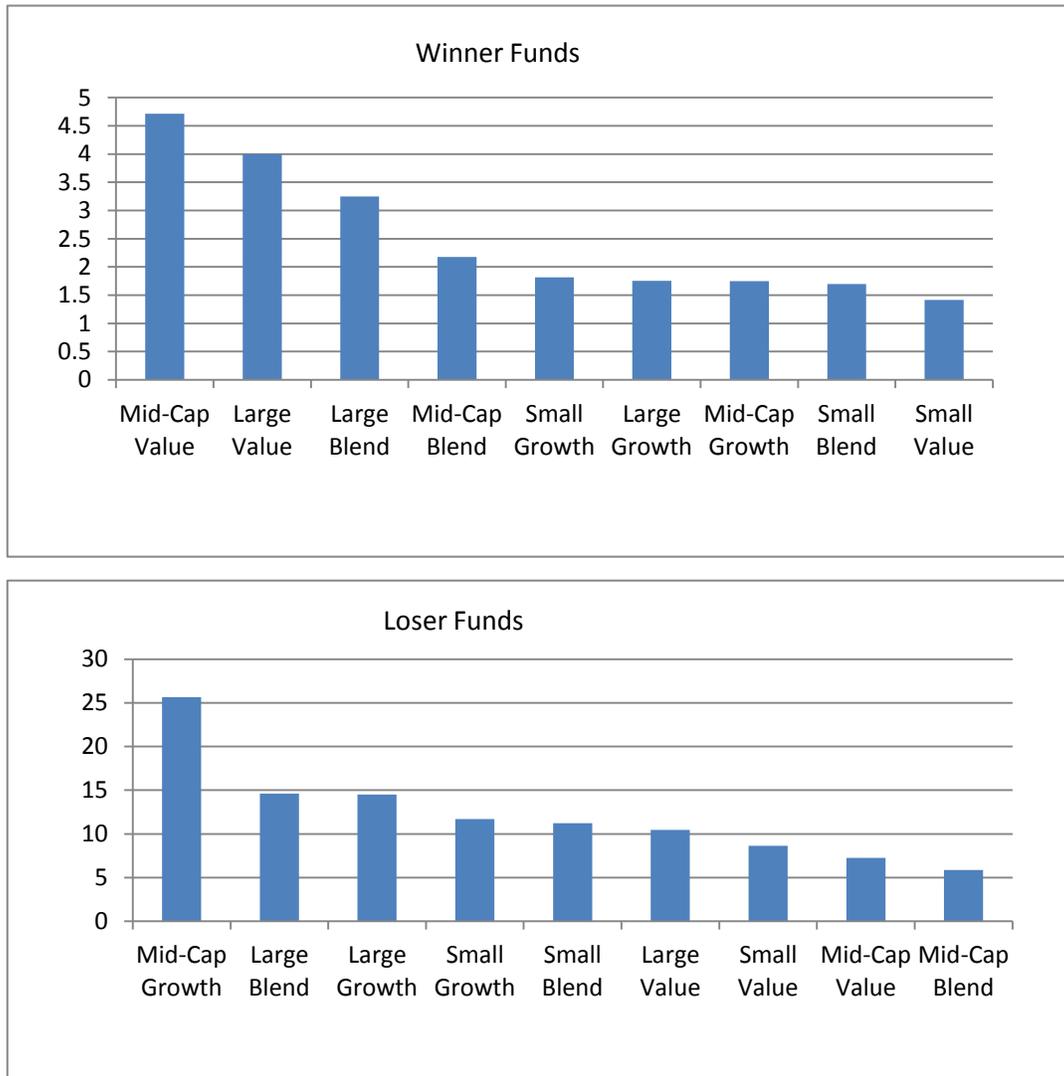


Table 2 compares the mean and the median alpha values of the winner funds and the loser funds. We see that the winner funds have the highest mean and median fund alphas in the 2001–2003 down market, while the lowest mean and median of alpha occur in the 2010–2012 up market. As for the loser funds, the lowest fund alpha is recorded in the period of 1998–2000 and the highest in the 2010–2012 up market. We see that the mean and the median alphas of the winner funds are close to each other, while the distribution of the alphas of the loser funds is skewed positively.

TABLE 2
SUMMARY STATISTICS OF THE ACTUAL FUND ALPHAS

Period	Market State	Observations		The Winner Funds		The Loser Funds	
		Winner	Loser	Mean	Median	Mean	Median
1998-2000	Up	193	61	0.884	0.804	-1.375	-1.218
2001-2003	Down	26	476	1.082	0.902	-0.809	-0.757
2004-2006	Up	78	161	0.594	0.548	-0.512	-0.364
2007-2009	Down	34	231	0.587	0.604	-0.589	-0.544
2010-2012	Up	52	197	0.460	0.425	-0.406	-0.350

Market Risk Exposure

In light of the tradeoff between risk and return, we compare the market factor exposure between the winner funds and the loser funds to see if it plays a role in fund alpha. Table 3 summarizes the loadings on the four market factors in Carhart's (1997) four-factor model for both fund groups.

TABLE 3
MARKET RISK EXPOSURES OF THE WINNER FUNDS AND THE LOSER FUNDS

Period	Market State	Obs	RMRF		SMB			HML			Momentum							
			+	-	+	-	(avg.)	+	-	(avg.)	+	-	(avg.)					
			(avg.)	(avg.)	(avg.)		(avg.)		(avg.)		(avg.)		(avg.)					
Panel A: The Winner Funds																		
1998-2000	Up	195	100%	0%	7.18%	1.54%	33.85%	22.56%	7.21%	84.07%	(0.89)	0%	(0.45)	(-0.31)	(0.37)	(-0.19)	(0.29)	(-0.30)
2001-2003	Down	26	100%	0%	50%	0%	50%	0%	7.69%	23.08%	(0.80)	0%	(0.51)	(0)	(0.51)	(0)	(0.18)	(-0.34)
2004-2006	Up	78	100%	0%	35.90%	15.39%	35.90%	8.97%	26.92%	28.23%	(0.95)	0%	(0.53)	(-0.20)	(0.29)	(-0.42)	(0.25)	(-0.18)
2007-2009	Down	33	100%	0%	33.33%	18.18%	9.09%	48.50%	33.36%	15.13%	(0.97)	0%	(0.43)	(-0.25)	(0.33)	(-0.34)	(0.10)	(-0.23)
2010-2012	Up	52	100%	0%	67.31%	23.08%	19.28%	9.62%	38.46%	19.23%	(0.85)	0%	(0.53)	(-0.22)	(0.26)	(-0.24)	(0.10)	(-0.09)
Panel B: The Loser Funds																		
1998-2000	Up	63	100%	0%	52.36%	7.96%	60.26%	4.75%	63.51%	9.49%	(1.21)	0%	(0.42)	(-0.20)	(0.59)	(-0.34)	(0.47)	(-0.28)
2001-2003	Down	483	100%	0%	59.25%	7.62%	24.85%	29.65%	55.68%	2.32%	(1.15)	0%	(0.60)	(-0.14)	(0.30)	(-0.37)	(0.26)	(-0.14)
2004-2006	Up	163	100%	0%	47.26%	12.87%	20.88%	31.32%	21.32%	19.68%	(0.98)	0%	(0.57)	(-0.24)	(0.29)	(-0.48)	(0.29)	(-0.18)
2007-2009	Down	231	100%	0%	60.15%	12.58%	41.98%	12.12%	18.36%	17.64%	(1.03)	0%	(0.82)	(-0.21)	(0.27)	(-0.26)	(0.09)	(-0.15)
2010-2012	Up	198	100%	0%	21.71%	13.16%	8.07%	24.73%	4.60%	18.40%	(1.08)	0%	(0.59)	(-0.18)	(0.23)	(-0.27)	(0.18)	(-0.16)

Panel A of Table 3 shows that the average RMRF (market excess return factor) loading of the winner funds is lower than that of the market portfolio, ranging from 0.80 in the 2001–2003 down market to 0.97 in the 2007–2009 down market. All of these loadings are positive, and there seems to be no relation between the winner funds' market factor exposure and the market state. That is, the winner funds seem not to increase market risk exposure in an up market or reduce this exposure in a down market. Panel B of Table 3 shows that the average RMRF loading of the loser funds is evidently higher than that of the winner funds, ranging from 0.98 in the 2004–2006 up market to 1.21 in the 1998–2000 up market. There seems to be no relation between market state and the market risk exposure of the loser funds.

Based on the size factor SMB, the winner funds tend to increase their holdings in small stocks over time during the sample period. For example, in the 1998–2000 up market, out of the 195 winner funds, only 7.18% exhibit a positive loading statistically significant at 5%, with an average of 0.45, and only 1.54% have a negative statistically significant loading, with an average of -0.31. In the 2010–2012 up market, 67.31% of the winner funds exhibit a statistically significant loading on SMB, with an average of 0.53, while 23.08% have a statistically significant negative loading, with an average value of -0.22. The loading on SMB of the winner funds does not change with market state. On the other hand, the loser funds tend to reduce their small stock holdings toward the end of the sample period. For instance, in the 1998–2000 up market, 52.36% of the winner funds have a positive SMB loading statistically significant at 5%, with an average value of 0.42, and this drops to 21.71%, with an average of 0.59, in the 2010–2012 up market. Meanwhile, the percentage of the loser funds with a negative SMB loading increased from 7.96% in the 1998–2000 up market to 13.16% in the 2010–2012 up market. Similar to the winner funds, the loser funds overall have a higher percentage of positive SMB loadings than negative ones.

As for the style factor HML, the winner funds have more positive loadings on HML in four of the five windows, which means that the winner funds invest more in value stocks. The only exception is in the 2007–2009 up market, where only 9.09% of the winner funds have a positive statistically significant loading, with an average of 0.33, and 48.50% of them have a negative statistically significant loading, with an average of -0.34. In contrast, the loser funds exhibit a higher percentage of negative statistically significant loadings on HML in three windows, including the 2001–2003 down market, the 2004–2006 up market, and the 2010–2012 up market. This indicates that the loser funds tend to hold more growth stocks in these periods. We also notice that in the most recent two windows the average values between the positive loading and the negative loading exhibit a symmetric pattern with opposite signs, and this holds for both fund groups.

The last factor is the momentum factor Momentum. As Panel A of Table 3 indicates, in the 1998–2000 up market, 7.21% of the winner funds exhibit a positive statistically significant momentum factor with an average of 0.29, and 84.07% of them have a negative momentum factor with an average of -0.30. Panel B shows that, in the same period, 63.51% of the loser funds have a positive statistically significant momentum factor while only 9.49% of them are negative. This suggests that most of the winner funds follow a contrarian strategy, and more than half of the loser funds adopt a momentum strategy during this period. A similar pattern is exhibited in the 2001–2003 down market. There is no major difference between the winner funds and the loser funds in the momentum factor loadings in both the 2004–2006 up market and in the 2007–2009 down market. In the 2010–2012 up market, 38.46% of the winner funds have a positive statistically significant momentum factor, and this percentage is 19.23% for funds with negative loading on Momentum. For the loser funds, these percentages are 4.60% and 18.40%, respectively. Moreover, the average values of the positive and the negative loadings on Momentum are almost symmetric to each other.

In summary, the winner funds tend to have lower market risk exposure and hold less small stocks and more value stocks than the loser funds. Based on the characteristics of the loadings on momentum factor, there seems to be no difference between the winner funds and the loser funds. The results indicate that, compared with the loser funds, the winner funds seem to have a more conservative strategy indicated by lower market risk exposure and more holdings in large stocks and value stocks.

Market-Timing and Stock-Selecting Skills

Fund alpha is often used to measure manager skill. As previously mentioned, there are several possible sources for fund alpha: market-timing ability, stock-selecting ability, and pure luck. In this section, we attempt to figure out whether fund alpha owes to the ability to time market changes and/or select stocks; to examine this issue, we add a market-timing factor to Carhart's four-factor model.⁵

$$r_{p,t} = \alpha + \sum_{i=1}^N \beta_i r_{i,t} + \omega r_{m,t} D + \varepsilon \quad (2)$$

Where $r_{p,t}$ is the monthly excess return on a fund; β_i is the loading on factor i , representing the monthly market excess return, the size factor, the style factor, and the momentum factor; ω measures the market-timing ability; $r_{m,t}$ stands for market excess return; and D is a dummy variable with a value of 1 if $r_{m,t} > 0$ and a value of 0 if $r_{m,t} < 0$.

Table 4 reports the summary statistics of the market-timing ability (ω) and the stock selectivity (α) of the winner funds and the loser funds in Panel A and Panel B, including the number of observations, the sign, and the statistical significance at the 5% level.

TABLE 4
MARKET TIMING ABILITY AND STOCK SELECTING ABILITY OF THE ACTUAL WINNER/LOSER FUNDS

Panel A: The Actual Winner Funds										
Period	Market	Total	Positive ω	Sig. @5%	Neg. ω	Sig. @5%	Positive α	Sig. @5%	Neg. α	Sig. @5%
1998-2000	Up	195	122	1	73	0	192	13	3	0
2001-2003	Down	26	15	1	11	0	19	4	7	0
2004-2006	Up	78	62	3	16	0	71	2	7	0
2007-2009	Down	34	13	3	21	2	30	5	4	0
2010-2012	Up	52	22	0	30	3	52	20	0	0
Panel B: The Actual Loser Funds										
Period	Market	Total	Positive ω	Sig. @5%	Neg. ω	Sig. @5%	Positive α	Sig. @5%	Neg. α	Sig. @5%
1998-2000	Up	63	22	0	41	2	4	0	59	3
2001-2003	Down	483	321	11	162	2	10	0	473	174
2004-2006	Up	162	56	1	106	3	19	0	143	23
2007-2009	Down	231	136	1	95	3	9	0	222	49
2010-2012	Up	198	89	4	109	7	20	0	178	34

As Panel A of Table 4 indicates, in the 1998–2000 up market, out of the 195 winner funds, 122 funds have a positive ω , though only one out of the 122 funds exhibits a ω statistically significant at 5%, which is equivalent to a 0.51% probability. Seventy-three funds have a negative ω , but none of them is statistically significant. In terms of stock selectivity, 192 funds have a positive α , and 13 of these are statistically significant. The other three funds have negative α , but none of them exhibits statistical significance. In the same period, as Panel B of Table 4 indicates, out of the 63 loser funds, 22 funds have a positive ω , but none of them is statistically significant. The other 41 funds have negative ω , two of

which are statistically significant. Based on stock selectivity, four of the 63 loser funds have a positive α , but none of them exhibits a statistical significance at the 5% level. On the other hand, 59 of the 63 funds have a negative α , three of which are statistically significant. Test results of this period indicate that the winner funds overall do not possess market-timing ability, though 13 of them (or 6.67%) exhibit stock-selecting skill. The loser funds seem not to have any market-timing ability, while 4.76% of them do exhibit a negative stock-selecting skill.

In the 2001–2003 down market, Panel A of Table 4 shows that 15 out of the 26 winner funds have a positive ω , one of which is statistically significant, while 11 of them have a negative ω , though none of them exhibits any statistical significance. On the side of stock selectivity, 19 of the 26 funds have a positive α , and four of these are statistically significant, while seven of them have a negative α , though none of them is statistically significant. In other words, 15.4% of the winner funds exhibit an ability to select stocks. Panel B of Table 4 shows the results of the loser funds during the same period. We can see that 321 of the 483 loser funds have a positive ω , 11 of which are statistically significant, while 162 loser funds have a negative ω , and two of these are statistically significant. As for stock selectivity, 10 of the loser funds have positive α , but none of them is statistically significant. In contrast, 473 of the 483 loser funds have negative α , and 174 of these are also statistically significant. Put another way, 36% of the loser funds exhibit a negative stock-selecting skill.

In the 2004–2006 up market, as Panel A shows, 62 of the 78 winner funds have positive ω , and three of these are statistically significant; 16 of the 78 funds have a negative ω , though none of them is statistically significant. In regard to stock selectivity, 71 of the winner funds have a positive α , and two of these are statistically significant; on the other hand, seven of them have a negative α , though none of them is statistically significant. Panel B of Table 4 reports the test results of the loser funds. We can see that 56 of the 162 loser funds have a positive ω , and one of them is statistically significant, while 106 of them have negative ω , and three of these are statistically significant. Nineteen of the loser funds have positive α , though none is statistically significant. One hundred and forty-three of the 162 loser funds have negative α , and 23 (or 14.20%) of these are statistically significant.

Table 4 also shows that during the 2007–2009 down market, three of the 34 winners have a positive market-timing skill statistically significant at 5%, and two of the funds have statistically significant negative ability to time the market. In addition, five of the winner funds have a statistically significant positive α . Out of the 231 loser funds, one fund exhibits a statistically significant positive ω , and three funds have negative market-timing ability. None of the loser funds has a statistically significant positive stock selectivity, as indicated by α , while 49 of the loser funds (or 21.21%) have a negative α statistically significant at 5%. In the 2010–2012 up market, none of the 52 winner funds exhibit any market-timing skill, and three of them even have a statistically significant negative ω . In stock selectivity, 20 of the 52 winner funds (or 38.46%) exhibit a statistically significant stock-selecting skill, and none of them has a negative α . As for the 198 loser funds, four of them have a positive ω statistically significant at 5%, and the number is seven for negative ω . Once again none of the loser funds has a statistically significant positive α , and 34 of the loser funds (or 17.17%) have a statistically significant negative stock-selecting skill.

From Table 4 we can see that the winner funds with a statistically significant market-timing factor (ω) range from 0% in the 2010–2012 up market to 8.82% in the 2007–2009 down market;⁶ overall the winner funds do not possess an ability to time the market changes. In addition, there is no evident difference between the winner funds and the loser funds in terms of the number and probability of funds with positive market-timing factor and their statistical significance.

In contrast, the winner funds and the loser funds demonstrate a clearly different pattern in stock selectivity measured by α . Panel A of Table 4 indicates that very few winner funds have a negative α , and none of them is statistically significant, whereas Panel B shows that very few of the loser funds have a positive α , and none of them is statistically significant. Furthermore, in the 2010–2012 up market, 38.46% of the winner funds demonstrate a positive statistically significant stock selectivity followed by 15.39% in the 2001–2003 down market. In the 2001–2003 down market, 36.02% of the loser funds have a statistically significant negative α , followed by 21.21% in the 2007–2009 down market. Overall the test

results indicate that stock selectivity seems to play a role in differentiating between the winner funds and the loser funds.

Bootstrapped Funds

To determine whether fund alpha results from manager skill or pure luck, we need a proxy of pure luck. In this section, we use a bootstrapped fund sample as the benchmark for pure luck (or “no skill”). A bootstrapped fund is constructed by randomly selecting a fund from each month in the sample period while maintaining the chronological order; thus, the performance of a bootstrapped fund is solely driven by luck. Repeating the same procedure 2,500 times, we get a bootstrapped fund sample of 2,500 funds.

Table 5 reports the number and the percentage of the bootstrapped funds with alpha statistically significant at the 5% level. We find that a small group of bootstrapped funds can earn alpha by sheer luck. The percentage of the bootstrapped winner funds ranges from 0.64% in the 2001–2003 down market to 3.12% in the 1998–2000 up market.⁷ We also see that the percentage of bootstrapped loser funds ranges from 0.92% in the 1998–2000 up market to 9.92% in the 2001–2003 down market. Overall the percentage of bootstrapped loser funds is higher than that of bootstrapped winner funds in four out of the five windows, which is similar to the pattern exhibited by the actual winner and the actual loser funds. In addition, compared with the actual funds, the bootstrapped funds have a lower probability of earning alpha, including both positive alpha and negative alpha.

TABLE 5
SUMMARY STATISTICS OF THE BOOTSTRAPPED WINNER/LOSER FUNDS

Period	Market State	Bootstrapped Funds	Observations		Percentage	
			Winner	Loser	Winner	Loser
1998-2000	Up	2,500	78	23	3.12%	0.92%
2001-2003	Down	2,500	16	231	0.64%	9.92%
2004-2006	Up	2,500	33	62	1.32%	2.48%
2007-2009	Down	2,500	31	87	1.24%	3.48%
2010-2012	Up	2,500	40	96	1.60%	3.84%

Table 5 shows that some bootstrapped funds can also earn statistically significant positive alpha by luck, and this probability ranges from 0.64% in the 2001–2003 down market to 3.12% in the 1998–2000 up market. Compared with the actual winner funds, the bootstrapped winner funds overall have a lower probability of earning positive alpha. As for the bootstrapped loser funds with a statistically significant negative alpha, the probability ranges from 0.92% in the 1998–2000 down market to 9.92% in the 2001–2003 down market, which is also lower than that of the actual loser funds, as reported in Table 1. In addition, the percentage of the bootstrapped winner funds is higher in four out of the five windows.

In light of this finding, fund alpha can come from pure luck; thus, alpha itself does not warrant a conclusion of manager skill. Next, we use the same model as exhibited in equation (2) to test the market-timing ability and stock selectivity of the bootstrapped winner/loser funds. The results are presented in Table 6.

TABLE 6
MARKET TIMING ABILITY AND STOCK SELECTING ABILITY OF THE BOOTSTRAPPED
WINNER/LOSER FUNDS

Panel A: The Bootstrapped Winner Funds										
Period	Market	Total	Positive ω	Sig. @5%	Neg. ω	Sig. @5%	Positive α	Sig. @5%	Neg. α	Sig. @5%
1998-2000	Up	78	42	3	36	0	66	6	12	0
2001-2003	Down	16	9	1	7	0	14	2	2	0
2004-2006	Up	33	18	3	15	0	29	3	4	0
2007-2009	Down	31	17	1	14	1	29	2	2	0
2010-2012	Up	40	23	0	17	2	35	8	5	0

Panel B: The Bootstrapped Loser Funds										
Period	Market	Total	Positive ω	Sig. @5%	Neg. ω	Sig. @5%	Positive α	Sig. @5%	Neg. α	Sig. @5%
1998-2000	Up	23	8	0	15	0	18	6	5	0
2001-2003	Down	231	108	5	123	2	10	0	221	47
2004-2006	Up	62	35	1	27	1	4	0	58	16
2007-2009	Down	87	39	1	48	2	8	0	79	8
2010-2012	Up	96	48	0	48	2	11	0	85	16

Panel A of Table 6 reports the results of the bootstrapped winner funds. We can see that more winner funds exhibit a positive market-timing ability than the loser funds; however, very few of them are statistically significant. The percentage of bootstrapped winner funds with statistically significant market-timing ability (ω) ranges from 0% in the 2010–2012 down market to 9.09% (or three out of 33) in the 2004–2006 up market. Compared with the actual winner funds, the bootstrapped winner funds overall exhibit a higher chance of market-timing ability. Based on the stock selectivity, most of the bootstrapped winner funds demonstrate positive stock-selecting skill, with a probability ranging from 6.45% (two out of 31) in the 2007–2009 down market to 20% (eight out of 40) in the 2010–2012 up market. Overall the bootstrapped winner funds have a lower probability of exhibiting statistically significant stock selectivity than the actual winner funds. In addition, none of the bootstrapped winner funds shows negative stock selectivity, and this also holds for the actual winner funds.

Panel B of Table 6 reports the market timing and stock selectivity of the bootstrapped loser funds. We can see that there is no pattern in regard to the sign and the statistical significance of the market-timing factor, and the bootstrapped loser funds seem to have a slightly lower chance of exhibiting market-timing ability than the bootstrapped winner funds. As for stock selectivity, the bootstrapped loser funds overall exhibit no positive stock selectivity; this is the same as that of the actual loser funds. Just like the actual loser funds, most of the bootstrapped loser funds exhibit a negative stock selectivity, and some of them are statistically significant.

Since bootstrapped funds can also earn statistically significant alpha, and there is no evident difference in market timing and stock selectivity between the actual winner/loser funds and their bootstrapped counterparts, we cannot equate fund alpha with manager skill.

SUMMARY

We found that a small group of funds can earn statistically significant alpha, and funds with positive alphas tend to have lower expense ratio, lower turnover ratio, and lower price to earnings (PE) ratio than

those of their counterparts. In addition, the mid-value funds have the highest chance of earning positive alphas, while the mid-growth funds have the highest chance of earning negative alphas. The probability of fund alpha occurrence changes over time, as does the value of fund alpha.

We examined the market risk exposures of the winner funds and the loser funds and found no evident difference. We also tested market-timing ability and stock selectivity of the winner funds and the loser funds. The test results show that none of the fund groups possesses an ability to time the market, though the winner funds tend to have a better stock selectivity than the loser funds. After examining a sample of bootstrapped funds, which have no skill, we found that fund alpha can also be earned by pure luck, and the bootstrapped winner/loser funds exhibit a similar pattern to that of the actual winner/loser funds in market-timing ability and stock selectivity. This finding suggests that manager skill measured by fund alpha is, at most, a temporary phenomenon; thus, it is not wise for investors to seek persistent fund alpha.

ENDNOTES

1. Winner funds refer to the funds with a positive alpha statistically significant at the 5% level, and loser funds refer to the funds with a negative alpha statistically significant at the 5% level.
2. Since each disc covers a one-year period, the survivorship bias and the incubation bias can be minimized.
3. Fund returns are the returns net of expenses.
4. The outperforming/underperforming probability refers to the probability of earning a statistically significant alpha with a positive/negative value.
5. The market-timing factor is based on Henriksson and Merton's (1981) return-timing model.
6. Percentages are calculated based on the corresponding observations in Table 4.
7. Bootstrapped winner funds refer to the bootstrapped funds with a positive alpha statistically significant at the 5% level, and bootstrapped loser funds refer to the bootstrapped funds with a negative alpha statistically at the 5% level.

REFERENCES

- Baker, M., Litov, L., Wachter, J. A. & Wurgler, J. (2010). Can Mutual Fund Managers Pick Stocks? Evidence from Their Trades Prior to Earnings Announcements. *Journal of Financial and Quantitative Analysis*, 45, 1111-1131.
- Becker, C., Wayne, F., Myers, D. & Schill, M. J. (1999). Conditional market timing with benchmark investors. *Journal of Financial Economics*, 52, 119-148.
- Berk, J. & Van Binsbergen, J. H. (2014). Measuring Managerial Skill in the Mutual Fund Industry, *Working Paper*.
- Carhart, M. M. (1997). On persistence in mutual fund performance, *Journal of Finance*, 52, 57-82.
- Chen, C. R., Lee, C.F., Rahman, S. & Chan, A. (1992). A Cross-Sectional Analysis of Mutual Funds' Market Timing and Security Selection Skill. *Journal of Business Finance & Accounting*, 19, 659-675.
- Chevalier, J. & Ellison, G. (1999). Are some mutual fund managers better than others? Cross-sectional patterns in behavior and performance, *Journal of Finance*, 54, 875-899.
- Chang, E. C. & Lewellen, W. G. (1984). Market timing and mutual fund investment performance. *Journal of Business*, 57, 57-72.
- Chen, C. R. & Stockum, S. (1986). Selectivity, Market Timing, and Random Beta Behavior of Mutual Funds: A Generalized Model, *Journal of Financial Research* 9, 87-96.
- Daniel, K., Grinblatt, M., Titman, S. & Wermers, R. (1997). Measuring mutual fund performance with characteristic-based benchmarks. *Journal of Finance*, 52, 1035-1058.
- Ding, B. & Wermers, R. (2012). Mutual Fund Performance and Governance Structure: The Role of Portfolio Managers and Boards of Directors, *Working Paper*.
- Elton, E. J., Gruber, M. J. & Blake, C. R. (2011). An Examination of Mutual Fund Timing Using Monthly Holdings Data. *Review of Finance*, 16, 619-645.

- Fama, E. F. & French, K. R. (1993). Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics*, 33, 3-56.
- Fama, E. F. & French, K. R. (2010). Luck versus Skill in the Cross-Section of Mutual Fund Returns, *Journal of Finance*, 65, 1915-1947.
- Friesen, G. & Sapp, T. (2007). Mutual fund flows and investor returns: An empirical examination of fund investor timing ability. *Journal of Banking and Finance*, 31, 2796 - 2816.
- French, K. R. (2008). The Cost of Active Investing. *Journal of Finance*, 63, 1537-1573.
- Grinblatt, M. & Titman, S. (1994). A study of monthly mutual fund returns and performance evaluation techniques. *Journal of Financial and Quantitative Analysis*, 29, 419-445.
- Henriksson, R. T. (1984). Market timing and mutual fund performance: An empirical investigation. *Journal of Business*, 57, 73-96.
- Ibbotson, R. G. & Patel, A. K. (2002). Do winners repeat with style? *Yale ICF Working Paper*, No.00-70.
- Henriksson, R. D. & Merton, C. (1981). On market timing and investment performance II: Statistical procedures for evaluating forecasting skills. *Journal of Business*, 54, 513-534.
- Jiang, G. J., Yao, T. & Yu, T. (2007). Do Mutual Funds Time the Market? Evidence from Portfolio Holdings. *Journal of Financial Economics*, 86, 724-758.
- Kacperczyk, M. T., Van Nieuwerburgh, S. & Veldkamp, L. (2014). Time-Varying Fund Manager Skill. *Journal of Finance*, 69, 1455-1484.
- Kaplan, S. N. & Berk A. S. (2005). Do Mutual Funds Time their Benchmarks? *Working Paper*.
- Kon, S. J. & Jen, F. C. (1979). The Investment Performance of Mutual Funds: An Empirical Investigation of Timing, Selectivity, and Market Efficiency. *The Journal of Business*, 52, 263-290.
- Kosowski, R., Timmermann, A., Wermers, R. & White H. (2006). Can mutual fund “stars” really pick stocks? New evidence from a bootstrap analysis. *Journal of Finance*, 61, 2551-2595.
- Lee, C.F. & Rahman, S. (1990). Market Timing, Selectivity, and Mutual Fund Performance: An empirical investigation. *The Journal of Business*, 63, 261-279.
- Lehmann, B. N. & Modest, D. M. (1987). Mutual fund performance evaluation: A comparison of benchmark and benchmark comparison. *Journal of Finance*, 42, 233-265.
- Malkiel, B. G. (1995). Returns from investing in equity mutual funds 1971 to 1991. *Journal of Finance*, 50, 549-572.
- Sharpe, W. F. (1991). The Arithmetic of Active Management, *Financial Analyst Journal*, 47, (1), 7-9.
- Treynor, J. L. & Mazuy, K.K. (1966). Can mutual funds outguess the market? *Harvard Business Review*, 44, 131-136.