

# Mutual Fund Performance and Manager Style

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*In this analysis of the relationship between equity mutual fund performance and manager style, two questions are addressed. First, does any investment style generate abnormal returns on average? Second, when funds are grouped by equity style, does any style exhibit performance persistence? The answers from this study are as follows: None of the styles earned positive abnormal returns during the 1965–98 sample period, and value funds realized negative abnormal returns of about 2.75 percentage points a year. Some evidence was found of short-run performance persistence among the best-performing growth funds and among the worst-performing small-cap funds.*

A number of recent studies have looked for evidence of persistence in mutual fund performance. These studies were trying to determine whether certain funds consistently outperform (or underperform) other mutual funds.<sup>1</sup> Although the evidence is mixed, the general conclusion from these articles is that a few fund managers do tend to regularly appear near the top of the annual return rankings. Stronger evidence indicates that some managers consistently appear near the bottom of the rankings. For investors, the main implication of these studies is the small likelihood of consistently earning abnormal returns by selecting individual fund managers.

In contrast to earlier studies, I examine the relationship between equity fund performance and manager style. I address two specific issues. The first is whether any particular investment style reliably delivers abnormal performance. The second is whether any evidence of performance persistence can be found when funds with similar styles are compared.

## Data and Methodology

The primary source of data for this study is the 1999 version of the U.S. Mutual Fund Database from the Center for Research in Security Prices (CRSP) at the University of Chicago. This database, which spans 1962 through 1998, is essentially free of the survivorship bias that plagues most studies of mutual fund performance. Because data for funds that died during the sample period are included in the database, the resulting statistics on fund performance

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provide a clear picture of performance for the various investment styles.<sup>2</sup>

In addition to the data from the CRSP mutual fund database, I used the monthly factor realizations from the Fama–French three-factor model. I used the Davis, Fama, and French (2000) database to calculate these factor realizations.

**Sample Selection.** Equity mutual funds were the subject of the tests in the study. Two criteria were used to select equity funds from the general set of mutual funds in the CRSP database. If a fund's stated objective was growth, growth and income, maximum capital gains, small-cap growth, or aggressive growth, I classified it as an equity fund and included it in the sample. Funds whose objectives were not listed but whose policy statements indicated they invested primarily in common stock were also included.

The sample consisted of 4,686 funds covering 26,564 fund-years from 1962 through 1998; that is, in 26,564 instances, a fund was classified as an equity fund and had at least one valid monthly return during the calendar year. The median of the equity weights for these 26,564 fund years is 93 percent, so the sample selection process did identify funds that were primarily equity portfolios.

**Style Identification.** I used the Fama–French three-factor model to infer a fund's investment style. In their model, SMB stands for Small minus Big and HML stands for High minus Low (meaning high book value minus low book value). For each fund, I used 36 monthly returns to estimate the following regression:

$$R_{i,t} - R_{f,t} = a_i + b_i (R_{m,t} - R_{f,t}) + s_i \text{SMB}_t + h_i \text{HML}_t + e_{i,t}$$

where

$R_{i,t}$  = the percentage return to fund  $i$  for month  $t$

$R_{f,t}$  = the U.S. T-bill return for month  $t$

$R_{m,t}$  = the return to the CRSP value-weighted index for month  $t$

$SMB_t$  = the realization on the capitalization factor (small-cap return minus large-cap return) for month  $t$

$HML_t$  = the realization on the value factor (value return minus growth return) for month  $t$

$e_{i,t}$  = an error term

Small-company stocks tend to have a positive loading on *SMB* (a positive slope,  $s_i$ ) and big-company stocks tend to have a negative loading. Similarly, a positive estimate of  $h_i$  indicates sensitivity to the value factor and a negative estimate indicates a growth tilt. Thus, funds were identified as small cap or large cap on the basis of their estimated *SMB* slopes, and funds were sorted into value and growth on the basis of their *HML* slopes. The intercept, sometimes referred to as alpha, is a measure of performance relative to the three-factor benchmark.

**Portfolio Formation.** I placed funds in style portfolios at the beginning of each year from 1965 through 1998. At the beginning of 1965, for example, returns for the previous 36 months (1962–1964) were used to estimate preformation slopes on the *HML* and *SMB* factors. Based on these preformation slopes, funds with similar styles were allocated into portfolios, and returns for these equally weighted portfolios were calculated for each month of 1965. The portfolios were re-formed each year.

I used univariate *SMB* and *HML* sorts to form decile portfolios and bivariate sorts to form portfolios based on the intersection of the *HML* and *SMB* rankings. In these bivariate sorts, a  $3 \times 3$  partitioning of the funds was created: Funds were divided into thirds on the basis of their *SMB* rankings (low, medium, and high *SMB* sensitivity) and into thirds on the basis of their *HML* ranking. This  $3 \times 3$  partitioning produced nine portfolios at the beginning of the year. For example, a fund that was in the top third of the *SMB* ranking and the bottom third of the *HML* ranking was in the high-*SMB*/low-*HML* (small/growth) portfolio.<sup>3</sup> The portfolios did not change during the year, except for funds that ceased to exist during the year. Repeating this process for each year yielded a time series

of 408 equally weighted monthly returns for each portfolio.

The tests for performance persistence used portfolios formed from bivariate sorts on *HML* and alpha and on *SMB* and alpha. In each case, a  $3 \times 3$  partitioning of the funds was created, with each of the independent sorts divided into thirds. Then, portfolios were formed on the basis of the intersections of these independent rankings. For example, the low-*HML*/low-alpha portfolio consisted of funds that were in the bottom third of the preformation *HML* ranking and the bottom third of the preformation alpha (intercept) ranking. Thus, this portfolio consisted of funds that had a growth emphasis during the preformation period and performed relatively poorly when compared with the three-factor benchmark.

**Tests for Abnormal Returns.** In addition to using the Fama–French three-factor model on preformation returns to infer fund style, I also used the model on postformation returns to identify abnormal performance. The time series of equally weighted returns for each portfolio was used in the three-factor regression model, with the intercept measuring abnormal performance. A positive intercept suggests superior performance, and a negative intercept suggests underperformance, relative to the three-factor benchmark.

I chose the three-factor model as the performance benchmark for two reasons. First, Davis, Fama, and French provided evidence that the three factors (the excess market return, the size factor, and the value-versus-growth factor) have explanatory power for security returns because they are associated with risk. If the factors do measure risk, then the average returns earned by fund managers should be large enough to compensate for these risk factors. Second, regardless of one's beliefs about what High minus Low and Small minus Big measure, the premiums associated with the factors can be earned by a passive strategy of buying a diversified portfolio of stocks with a desired level of sensitivity to the factors. Therefore, if active fund management has economic value, active managers should be able to outperform such passive strategies.

## Results for Style-Based Portfolios

Reported in this section are the results for the portfolios formed by univariate sorts, the portfolios formed by independent *HML* and *SMB* sorts, and the portfolios formed by *SMB*/alpha and *HML*/alpha sorts.

**Portfolios Formed by Univariate Sorts.**

Three-factor regression results for funds sorted by preformation *HML* slopes are in **Table 1**. Panel A shows average preformation slopes for each *HML* decile, and Panel B shows regression results for equally weighted decile returns. In Panel B, the high  $R^2$  values, coupled with the magnitudes of the *t*-statistics on the regressors, indicate that the three-factor model captures much of the variation in decile returns. Because the regression coefficients were measured with error, the spread on the *HML* slopes between extreme deciles is much smaller in the postformation regressions than in the preformation averages. Postformation *HML* coefficients are still monotonic across deciles, however, which

suggests that the sorting procedure was able to identify the funds that tended to have a value or growth emphasis. Note that the postformation *HML* coefficient for Decile 10 is only 0.20, which indicates that even the funds in the top *HML* decile did not have much of an exposure to the value factor. Funds appear to be reluctant to fill their portfolios with value stocks.<sup>4</sup>

The intercepts in Table 1 indicate that growth funds performed better than value funds, relative to the three-factor benchmark, in the 1965–98 period. In both panels, the intercepts for the first five deciles are mostly positive whereas the intercepts for Deciles 6–10 are nearly all negative. The only postformation intercept that is reliably differ-

**Table 1. Three-Factor Results for Deciles of Mutual Funds Formed from *HML* Sorts, 1965–98**  
(*t*-statistics in parentheses)

<i>HML</i> Decile	Intercept	$R_m - R_f$	SMB	<i>HML</i>	$R^2$
<i>A. Preformation averages by decile</i>					
1	0.17	0.83	0.46	-0.81	
2	0.08	0.90	0.31	-0.43	
3	0.07	0.90	0.24	-0.29	
4	0.03	0.91	0.22	-0.18	
5	0.02	0.89	0.17	-0.09	
6	-0.01	0.89	0.14	-0.01	
7	-0.05	0.85	0.16	0.07	
8	-0.05	0.87	0.16	0.16	
9	-0.07	0.85	0.18	0.28	
10	-0.30	0.91	0.28	0.75	
<i>B. Postformation regression coefficients</i>					
1	0.13 (1.76)	1.03 (56.59)	0.45 (17.43)	-0.45 (-15.08)	0.94
2	0.04 (0.80)	0.98 (71.18)	0.29 (14.61)	-0.31 (-13.59)	0.96
3	0.04 (0.86)	0.95 (91.22)	0.23 (15.71)	-0.25 (-14.64)	0.97
4	0.03 (0.76)	0.94 (95.99)	0.23 (16.11)	-0.16 (-10.17)	0.97
5	-0.05 (-1.41)	0.92 (96.97)	0.17 (12.93)	-0.10 (-6.73)	0.97
6	-0.04 (-1.03)	0.93 (109.39)	0.16 (13.43)	-0.05 (-3.49)	0.98
7	-0.03 (-0.89)	0.87 (90.30)	0.17 (12.55)	0.02 (1.54)	0.97
8	0.01 (0.35)	0.87 (84.34)	0.20 (13.60)	0.04 (2.59)	0.96
9	-0.04 (-1.12)	0.86 (93.76)	0.22 (17.05)	0.15 (9.94)	0.97
10	-0.23 (-2.75)	0.83 (40.20)	0.40 (13.52)	0.20 (5.95)	0.86

ent from zero is the  $-0.23$  estimate for Decile 10. This intercept indicates that the funds in *HML* Decile 10 underperformed the three-factor benchmark by about 2.75 percentage points (pps) a year on average. So, Table 1 provides at least some evidence of abnormal performance, but it is negative on the part of funds with the most value tilt.

Table 2 shows regression results for funds sorted by preformation SMB slopes. As in Table 1, the explanatory variables are strongly related to decile returns and the  $R^2$  values are close to 1. Most of the postformation intercepts are negative, and none is reliably different from zero. In short, I found no evidence of abnormal performance for any of these portfolios. The three-factor model does

a good job explaining the returns to the *SMB* deciles.

**Portfolios Formed by Independent *HML* and *SMB* Sorts.** Regression results for portfolios formed by independent *HML* and *SMB* sorts are in Table 3. The first row in each panel shows results for funds that had low sensitivity to both the *SMB* and *HML* factors. This portfolio corresponds to a large/growth style. The bottom row shows results for funds that had high sensitivity to both factors. The inferred style for these funds is small/value. The other rows show various combinations of sensitivities to the two factors.

None of the postformation intercepts in Panel B of Table 3 is reliably different from zero. The

**Table 2. Three-Factor Results for Deciles of Mutual Funds Formed from *SMB* Sorts, 1965–98**  
(*t*-statistics in parentheses)

SMB Decile	Intercept	$R_m - R_f$	<i>SMB</i>	<i>HML</i>	$R^2$
<i>A. Preformation averages by decile</i>					
1	0.05	1.00	-0.44	0.08	
2	0.02	0.88	-0.15	-0.02	
3	0.01	0.87	-0.05	-0.03	
4	0.01	0.87	0.03	-0.03	
5	-0.01	0.88	0.11	-0.03	
6	-0.01	0.88	0.20	-0.07	
7	0.02	0.90	0.32	-0.08	
8	0.01	0.89	0.47	-0.11	
9	0.00	0.86	0.66	-0.16	
10	-0.21	0.78	1.14	-0.08	
<i>B. Postformation regression coefficients</i>					
1	-0.12 (-1.69)	0.91 (53.95)	-0.03 (-1.15)	0.01 (0.09)	0.90
2	-0.05 (-1.52)	0.89 (100.47)	0.01 (0.10)	-0.03 (-2.31)	0.97
3	-0.03 (-0.79)	0.89 (110.97)	0.05 (4.02)	-0.04 (-3.03)	0.98
4	-0.02 (-0.67)	0.90 (103.19)	0.08 (6.77)	-0.04 (-2.76)	0.97
5	-0.02 (-0.65)	0.91 (111.18)	0.12 (10.02)	-0.07 (-5.16)	0.98
6	0.01 (0.20)	0.90 (95.49)	0.19 (14.30)	-0.08 (-5.33)	0.97
7	-0.01 (-0.25)	0.92 (86.34)	0.31 (20.31)	-0.12 (-6.66)	0.97
8	0.01 (0.15)	0.92 (73.56)	0.44 (24.74)	-0.15 (-7.25)	0.96
9	0.02 (0.35)	0.96 (67.91)	0.56 (27.61)	-0.19 (-8.38)	0.96
10	-0.06 (-0.76)	0.97 (50.11)	0.76 (27.66)	-0.19 (-6.09)	0.93

**Table 3. Three-Factor Results for Portfolios of Mutual Funds Formed from Independent *SMB* and *HML* Sorts, 1965–98**  
(*t*-statistics in parentheses)

<i>SMB</i> Ranking	<i>HML</i> Ranking	Intercept	$R_m - R_f$	<i>SMB</i>	<i>HML</i>	$R^2$
<i>A. Preformation averages</i>						
Low	Low	0.20	0.89	-0.18	-0.41	
Low	Medium	0.03	0.89	-0.16	-0.05	
Low	High	-0.11	0.92	-0.22	0.36	
Medium	Low	0.12	0.92	0.17	-0.42	
Medium	Medium	-0.01	0.87	0.16	-0.05	
Medium	High	-0.10	0.85	0.16	0.28	
High	Low	0.03	0.85	0.73	-0.55	
High	Medium	-0.02	0.90	0.64	-0.06	
High	High	-0.20	0.82	0.75	0.43	
<i>B. Postformation regression coefficients</i>						
Low	Low	0.01 (0.21)	0.94 (76.81)	0.03 (1.96)	-0.22 (-10.89)	0.96
Low	Medium	-0.05 (-1.59)	0.90 (107.93)	-0.02 (-1.73)	-0.04 (-2.96)	0.97
Low	High	-0.09 (-1.86)	0.85 (68.29)	0.04 (2.48)	0.15 (7.50)	0.93
Medium	Low	0.08 (1.61)	0.96 (76.03)	0.20 (11.33)	-0.32 (-15.29)	0.96
Medium	Medium	-0.03 (-0.92)	0.91 (104.98)	0.15 (12.04)	-0.08 (-5.41)	0.98
Medium	High	-0.02 (-0.66)	0.86 (96.68)	0.16 (12.88)	0.12 (8.50)	0.97
High	Low	0.05 (0.80)	1.01 (60.27)	0.57 (23.90)	-0.37 (-13.48)	0.95
High	Medium	-0.03 (-0.66)	0.95 (76.40)	0.53 (29.60)	-0.13 (-6.33)	0.96
High	High	-0.08 (-1.20)	0.87 (51.24)	0.56 (23.25)	0.08 (2.83)	0.92

largest intercept in absolute terms is the -0.09 estimate for the large/value style (high *HML* sensitivity coupled with low *SMB* sensitivity). This point estimate corresponds to underperformance of about 1.1 pps a year, but because the intercept is only 1.86 standard errors from zero, the abnormal performance was not consistent. Although none of the style portfolios in Table 3 shows evidence of reliable abnormal performance, a tendency for value funds to underperform growth funds is clear when *SMB* sensitivity is held constant. For all three levels of *SMB* sensitivity, the postformation intercept for the high-*HML* portfolio is at least 10 basis points (bps) below the intercept for the corresponding low-*HML* portfolio.

The main conclusion to be drawn from Tables 1–3 is that value funds clearly performed poorly over the past 30+ years. The performance of *HML*

Decile 10 was dismal when compared with the three-factor benchmark.

**Portfolios Formed by *SMB*/Alpha and *HML*/Alpha Sorts.** Three-factor regression results for the nine portfolios formed from independent sorts on preformation *HML* slopes and preformation intercepts are in Table 4. Panel A contains the preformation averages for each portfolio, and Panel B presents the postformation regression coefficients. Panel C shows regression results for the portfolios one year after formation. (For example, the returns to the nine portfolios for 1966 were based on portfolio composition at the beginning of 1965.) By comparing the three panels of Table 4, the reader can assess the magnitude and duration of performance persistence for various levels of *HML* sensitivity.

**Table 4. Three-Factor Results for Portfolios of Mutual Funds Formed by Independent HML and Alpha Sorts, 1965–98**  
(*t*-statistics in parentheses)

HML Ranking	Alpha Ranking	Intercept	$R_m - R_f$	SMB	HML	$R^2$
<i>A. Preformation averages</i>						
Low	Low	-0.65	0.79	0.43	-0.48	
Low	Medium	-0.01	0.92	0.24	-0.40	
Low	High	0.65	0.93	0.30	-0.50	
Medium	Low	-0.50	0.90	0.24	-0.05	
Medium	Medium	-0.01	0.88	0.09	-0.05	
Medium	High	0.50	0.89	0.20	-0.06	
High	Low	-0.72	0.85	0.27	0.42	
High	Medium	-0.01	0.85	0.12	0.26	
High	High	0.64	0.90	0.25	0.41	
<i>B. Postformation regression coefficients</i>						
Low	Low	-0.07 (-1.18)	0.97 (61.68)	0.34 (15.32)	-0.26 (-9.98)	0.94
Low	Medium	0.08 (1.73)	0.98 (81.42)	0.25 (14.27)	-0.31 (-15.64)	0.97
Low	High	0.14 (2.30)	0.99 (65.28)	0.37 (17.17)	-0.36 (-14.56)	0.95
Medium	Low	-0.10 (-2.29)	0.93 (86.87)	0.21 (13.93)	-0.07 (-3.82)	0.97
Medium	Medium	-0.01 (-0.34)	0.91 (124.18)	0.11 (10.02)	-0.06 (-5.21)	0.98
Medium	High	0.01 (0.18)	0.91 (87.04)	0.25 (16.93)	-0.11 (-6.18)	0.97
High	Low	-0.11 (-1.87)	0.86 (59.58)	0.30 (14.65)	0.16 (6.64)	0.93
High	Medium	-0.03 (-0.79)	0.85 (102.03)	0.14 (11.67)	0.11 (8.28)	0.97
High	High	-0.08 (-1.32)	0.85 (54.74)	0.34 (15.38)	0.07 (2.91)	0.92
<i>C. Regression coefficients one year after ranking</i>						
Low	Low	-0.12 (-2.04)	0.96 (67.51)	0.33 (16.09)	-0.22 (-9.33)	0.95
Low	Medium	-0.03 (-0.67)	0.99 (84.34)	0.21 (12.52)	-0.29 (-14.84)	0.97
Low	High	0.05 (0.85)	0.99 (68.78)	0.33 (16.06)	-0.35 (-14.82)	0.96
Medium	Low	-0.04 (-0.76)	0.92 (81.05)	0.22 (13.25)	-0.10 (-5.53)	0.96
Medium	Medium	0.01 (0.33)	0.91 (121.73)	0.11 (10.22)	-0.07 (-5.36)	0.98
Medium	High	-0.01 (-0.24)	0.90 (90.90)	0.23 (16.32)	-0.11 (-6.91)	0.97
High	Low	-0.06 (-0.90)	0.86 (56.53)	0.31 (14.13)	0.10 (4.20)	0.92
High	Medium	0.01 (0.11)	0.86 (108.92)	0.14 (12.22)	0.10 (7.74)	0.98
High	High	-0.04 (-0.78)	0.84 (63.36)	0.28 (14.63)	0.04 (1.92)	0.94

In Panel A, the spread in intercepts between low-alpha and high-alpha portfolios is at least 1 pp a month for all three levels of *HML* sensitivity. In Panel B, the spreads narrow dramatically, although the ranking across alpha portfolios is preserved for both the low-*HML* portfolios and the medium-*HML* portfolios. For the high-*HML* portfolios, all three intercepts in Panel B are negative, which confirms that value funds have not done well in recent years. Two of the intercepts in Panel B are more than two standard errors from zero, and one of them is positive. The 0.14 point estimate for the low-*HML*/high-alpha portfolio corresponds to abnormal performance of about 1.7 pps a year. Although this abnormal performance disappears in Panel C, the evidence from Table 4 is that some growth managers have been able to maintain good performance over short horizons.

Results for the nine *SMB*/alpha portfolios are shown in Table 5. As in Table 4, the spreads in average preformation intercepts shown in Table 5 are large for all three levels of *SMB* sensitivity. In Panel B, only the high-*SMB* portfolios maintain the same ordering of intercepts across alpha portfolios. Although the ranking for these portfolios remains the same, the spread in intercepts falls dramatically. In Panel A, the difference between the high-*SMB*/high-alpha portfolio and the high-*SMB*/low-alpha portfolio is nearly 150 bps. In Panel B, that spread falls to less than 25 bps. One year later (Panel C), the spread is less than 10 bps. So, although this study provides some evidence of persistence among funds with a small-cap emphasis, the persistence dies out quickly. Furthermore, the only intercept in Panel B that is reliably different from zero is the  $-0.13$  estimate for the high-*SMB*/low-alpha portfolio. This estimate indicates that much of the persistence among small-cap managers is a result of persistence among the poor performers.<sup>5</sup> Note that the intercept for the best-performing portfolio in Panel C of Table 5 is 0.01.

## Conclusions

The results of this study are not good news for investors who purchase actively managed mutual funds. No investment style in the study generated positive abnormal returns over the 1965–98 period.

Although I found some evidence of performance persistence among the best-performing growth funds, this abnormal performance was not sustained beyond one year. The finding of performance persistence among poorly performing small-cap managers is similar to the results of Quigley and Siquefield (2000) for unit trusts in the United Kingdom. Apparently, the persistence of poor performance among small-cap managers is not a problem for U.S. investors alone.

Tables 1–5 provide *t*-statistics for 65 regression intercepts. Even if fund managers add no value at all, we would expect to see about three of these intercepts more than two standard errors from zero just by chance. In fact, there are five such intercepts. So, although the evidence of abnormal performance is slim, it is more than we would expect to see if the null hypothesis of no abnormal performance were absolutely true. For investors, the troubling aspect of these results is that four of the five “significant” intercepts are negative.

Perhaps the biggest disappointment in the past three decades is the inability (or unwillingness) of funds to capture the value premium that has been observed in common stock returns during the period. When funds are ranked by their sensitivity to the value factor (*HML*), even the extreme decile does not have much of a value tilt. Furthermore, the funds that had at least a small sensitivity to the value factor were the poorest performers. Two questions immediately come to mind. First, why were so few fund managers willing to own value stocks during a period when value stocks had higher average returns? Second, why did the funds that had at least some value exposure perform so poorly? The answers to these questions are not obvious. Neither is the economic benefit to active fund management.

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*This article benefited from the comments of David Booth, Truman Clark, Eugene Fama, Kenneth French, Rex Siquefield, Weston Wellington, and participants at Dimensional Fund Advisors' 1998 Investment Symposium.*



**Table 5. Three-Factor Results for Portfolios of Mutual Funds Formed by Independent SMB and Alpha Sorts, 1965–98**  
(*t*-statistics in parentheses)

SMB Ranking	Alpha Ranking	Intercept	$R_m - R_f$	SMB	HML	$R^2$
<i>A. Preformation averages</i>						
Low	Low	-0.55	0.92	-0.21	0.14	
Low	Medium	-0.01	0.88	-0.14	-0.01	
Low	High	0.54	0.90	-0.21	-0.10	
Medium	Low	-0.50	0.90	0.17	0.02	
Medium	Medium	-0.01	0.88	0.15	-0.04	
Medium	High	0.51	0.86	0.17	-0.15	
High	Low	-0.79	0.79	0.77	-0.05	
High	Medium	-0.01	0.89	0.62	-0.13	
High	High	0.69	0.93	0.70	-0.15	
<i>B. Postformation regression coefficients</i>						
Low	Low	-0.11 (-1.85)	0.90 (59.96)	0.05 (2.24)	0.04 (1.65)	0.92
Low	Medium	-0.01 (-0.23)	0.89 (121.22)	-0.04 (-3.46)	-0.03 (-2.25)	0.98
Low	High	-0.04 (-0.98)	0.90 (81.82)	0.04 (2.69)	-0.10 (-5.41)	0.96
Medium	Low	-0.05 (-1.12)	0.88 (83.79)	0.19 (12.44)	-0.02 (-1.19)	0.96
Medium	Medium	-0.01 (-0.17)	0.92 (121.02)	0.14 (13.19)	-0.07 (-5.32)	0.98
Medium	High	-0.01 (-0.18)	0.92 (80.14)	0.21 (12.70)	-0.15 (-8.03)	0.96
High	Low	-0.13 (-2.17)	0.94 (64.97)	0.58 (27.94)	-0.10 (-4.28)	0.95
High	Medium	0.01 (0.09)	0.95 (72.62)	0.49 (25.95)	-0.17 (-8.00)	0.96
High	High	0.10 (1.53)	0.96 (60.31)	0.59 (26.15)	-0.21 (-8.23)	0.95
<i>C. Regression coefficients one year after ranking</i>						
Low	Low	-0.07 (-1.18)	0.88 (62.18)	0.09 (4.21)	0.03 (1.11)	0.93
Low	Medium	-0.02 (-0.52)	0.89 (120.85)	-0.01 (-1.19)	-0.03 (-2.54)	0.98
Low	High	-0.01 (-0.19)	0.89 (81.17)	0.06 (4.14)	-0.10 (-5.60)	0.96
Medium	Low	-0.05 (-0.99)	0.90 (77.12)	0.18 (10.90)	-0.06 (-2.93)	0.96
Medium	Medium	-0.01 (-0.20)	0.92 (116.32)	0.13 (11.52)	-0.06 (-4.75)	0.98
Medium	High	0.01 (0.20)	0.91 (81.47)	0.19 (11.74)	-0.15 (-8.42)	0.96
High	Low	-0.06 (-0.96)	0.94 (64.21)	0.53 (25.50)	-0.10 (-4.16)	0.95
High	Medium	-0.02 (-0.47)	0.96 (74.79)	0.45 (24.12)	-0.16 (-7.58)	0.96
High	High	0.01 (0.19)	0.98 (71.24)	0.52 (26.24)	-0.23 (-10.34)	0.96



## Notes

1. For examples, see Carhart (1997), Elton, Gruber, Das, and Blake (1996), Goetzmann and Ibbotson (1994), Grinblatt and Titman (1992), Gruber (1996), and Hendricks, Patel, and Zeckhauser (1993).
2. See Carhart for a discussion of the construction of the CRSP database.
3. The main advantage of using independent *SMB* and *HML* sorts (instead of conditional sorts) is the simultaneous dispersion that is attained in both sorts. The disadvantage of this procedure is that the portfolios do not all contain the same number of funds. On average for the years in the study, the low-*HML*/high-*SMB* portfolio was the largest, with an average of 77.6 funds. The medium-*HML*/high-*SMB* portfolio tended to be the smallest, with an average of 45.3 funds.
4. Chan, Chen, and Lakonishok (1999) also reported a tendency for mutual funds to favor growth stocks.
5. At least part of the performance persistence for the worst-performing small-cap funds is the result of the high expense ratios for these funds. Of the nine portfolios in Table 5, the high-*SMB*/low-alpha portfolio had the highest average expense ratio (1.33 percent). The next highest average expense ratio was 1.18 percent for the medium-*SMB*/low-alpha portfolio. See Carhart for an analysis of the relationship between performance persistence and expense ratios.

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