The Nonpersistence of Mutual Fund Performance

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Several recent papers document a positive persistence in mutual fund performance; that is, yesterday's winning (losing) mutual funds tend to be tomorrow's winning (losing) mutual funds. This study confirms these results when we use methodologies and time periods similar to those used in the past studies. The positive persistence disappears, however, when either the various dimensions of risk are more fully controlled or the more recent past is examined. Investing in yesterday's winning mutual funds is not a reliable strategy for being in tomorrow's winning mutual funds.

INTRODUCTION

Investors would love to know that choosing future winning mutual funds is as simple as choosing those that performed well in the past. Much effort has been expended recently to determine if such a rule exists. Hendricks, Patel, and Zeckhauser (1993), Goetzmann and Ibbotson (1994), Malkiel (1995), and Brown and Goetzmann (1995) find varying degrees of positive persistence in mutual fund returns; they all find that at least to some extent (unlike the standard mutual fund ad disclaimer), past performance does predict future performance. In this paper we also can find persistence. We find this positive persistence disappears, however, when we use more complete risk adjustments. The positive persistence also disappears in the 1990s when we use any of the risk adjustments. Therefore, we believe the evidence in this article is more consistent with informationally efficient markets than with mutual fund managers possessing special abilities to sustain consistently superior performance.

We believe that the positive persistence found by others is the result of persistence in broad equity classes (macropersistence) rather than sustainable managerial ability (micropersistence). If there were periods in the past in which a particular equity class (small cap value, for example) tended to do well relative to a generic index such as the S&P 500, then funds that had a small cap value investment objective would appear to have positive persistence relative to the S&P 500. Yet it would not be proper to conclude

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that the managers of these funds were particularly adept at selecting securities. Rather, the observed persistence simply would result from a phenomenon that a generic index such as the S&P 500 cannot adequately capture. The reverse argument would hold for funds that had an investment objective that happened to underperform the S&P 500. The extent to which there is macropersistence in the 1980s and 1990s and how it could be misconstrued as micropersistence are discussed in an appendix.

DATA

We use monthly return data for 87 mutual funds and 14 different market indices from 1983 to 1994 to examine the issue of performance persistence. The funds are chosen at random from diversified debt and/or equity funds listed in the 1984 *CDA/Wiesenberger Investment Companies Yearbook* (which reports end of year 1983 data).[1] Over time ten funds are dropped because they are acquired by other funds. By selecting our sample at the end of 1983 and following it forward through time we avoid the potential for survivorship bias to cause the type of spurious positive persistence discussed in Brown, Goetzmann, Ibbotson, and Ross (1992).

We find that the Goetzmann and Ibbotson (1994) methodology and presentation of results are the most easily understood by practitioners; therefore, we follow their methodology and presentation closely. For example, we collect monthly return data on these funds so that we can estimate alphas and betas for 24 month periods in the same way as Goetzmann and Ibbotson (1994). As a robustness check and to look at the one and three year persistence windows, however, we also employ 12 and 36 month alphas and betas.

We obtain most or our monthly returns from *Morningstar Mutual Funds OnDisc*. Some of the funds were acquired before *OnDisc* became available in 1991. To prevent survivorship bias, monthly return data on the funds missing from *OnDisc* are obtained from *Standard & Poor's Daily Stock Price Record—NASDAQ*, *Standard & Poor's Quarterly Dividend Record*, and *Barron's*.

The 14 market indices we use comprise two bond market indices and 12 equity market indices. The two bond market indices are the long-term Treasury and the long-term corporate bond return indices published in Ibbotson Associates' *Stocks, Bonds, Bills and Inflation Yearbook* (hereafter SBBI). The first two equity indices are the large company and small company stock return indices also published in SBBI. The next four equity indices are the large company value, large company growth, small company value, and small company growth stock indices provided by Dimensional Fund Advisors, Inc. (DFA). These indices are based on the portfolios created in Fama and French (1992). The final six stock market indices are large, medium, and small company value and large, medium, and small company growth stock indices provided by Wilshire Associates Inc. To compute returns in excess of a risk free rate, we collect monthly T-bill returns from SBBI.

ESTIMATING ALPHAS

We measure mutual fund performance via a multi-index Jensen's alpha. Following Goetzmann and Ibbotson (1994), we estimate alpha by regressing fund returns on our

[1] By *diversified*, we mean that we exclude sector and specialty funds.

market indices for 24 months at a time (for those funds with at least 20 months worth of returns in the 24 month period). As an example, we show the regression equation used for estimating alpha for a particular fund when we are using the four SBBI indices only (as all variables are concurrently either index returns or the returns of a given fund, subscripts indicating time and fund have been omitted):

$$(1)\ R_P - R_f = \hat{\alpha} + \hat{\beta}_{LTTB}(R_{LTTB} - R_f) + \hat{\beta}_{LTCB}(R_{LTCB} - R_f) + \hat{\beta}_{LRG}(R_{LRG} - R_f) + \hat{\beta}_{SML}(R_{SML} - R_f) + \varepsilon$$

where:

R_P	=	Monthly return net of expenses of a particular fund;
R_f	=	Monthly T-bill return as reported in SBBI;
α	=	Estimated Jensen's alpha;
β_i	=	Estimated fund beta with respect to index i;
R_i	=	Monthly return on index i;
i	=	LTTB: long-term Treasury bond; LTCB: long-term corporate bond; LRG: large company equity; SML: small company equity; and
ε	=	Monthly residual.

When we use the DFA equity indices (in an equation similar to equation (1)), we are estimating four DFA equity betas and two SBBI debt betas. When we use the Wilshire equity indices (in an equation similar to equation (1)), we are estimating six Wilshire equity betas and two SBBI debt betas.

To be comparable to the results of Goetzmann and Ibbotson, we examine how well past two year alphas predict future two year alphas. As in Goetzmann and Ibbotson, we classify funds with a two year alpha equal to or above the median alpha for each two year period as *winners*. All other funds are classified as *losers* for that two year period.

PERSISTENCE RESULTS

TWO YEAR PERFORMANCE WINDOWS—ALL OBSERVATIONS

Table 1 presents two way tables that show the extent to which winners and losers repeat. The following expanded guide explains what each number in the two way tables means. If there is no persistence, the row percents all would be 50 percent, indicating that 50 percent of the prior winners were repeat winners and 50 percent were losers in the subsequent period and vice versa for prior losers. Positive persistence occurs when more than 50 percent of prior winners are repeat winners and vice versa for prior losers. Negative persistence occurs when more than 50 percent of prior winners become losers in the subsequent period and vice versa for prior losers. Therefore, positive persistence is observed as a concentration of the sample in the NW and SE cells of the two way table, while negative persistence is observed as a concentration of the sample in the NE and SW cells.

A Guide to the Two Way Tables

Number *Row Percent*	Winner	Loser
Prior Two Year	**Number of prior two year winners that are winners in current two year period**	**Number of prior two year winners that are losers in current two year period**
Winner	*Percent of prior two year winners that are winners in current two year period*	*Percent of prior two year winners that are losers in current two year period*
Prior Two Year	**Number of prior two year losers that are winners in current two year period**	**Number of prior two year losers that are losers in current two year period**
Loser	*Percent of prior two year losers that are winners in current two year period*	*Percent of prior two year losers that are losers in current two year period*
Sign p-value	*Neutral* if no significant persistence *Positive* if significant positive persistence *Negative* if significant negative persistence	Two tail p-value of significance of persistence

The initial results in Table 1 are consistent with Goetzmann and Ibbotson (1994). When we use the SBBI indices we find significant positive persistence on average for all of the years and for 1985 to 1988 in particular.[2] The 1985 to 1986 and 1987 to 1988 periods are noteworthy because these years overlap the years in which Goetzmann and Ibbotson (1994) and Hendricks, Patel, and Zeckhauser (1993) find strong positive persistence. Also, Malkiel (1995) and Brown and Goetzmann (1995) find strong positive persistence on a year by year basis in the 1985 to 1986 and 1986 to 1987 period. They find negative persistence, however, in the 1987 to 1988 period.

Positive persistence fails to persist in the later periods (1989 to 1990, 1991 to 1992, and 1993 to 1994). In 1989 to 1990 persistence is effectively neutral; in 1991 to 1992 it is significantly negative; and in 1993 to 1994 it is significantly positive. Overall during 1989 to 1994 persistence is effectively neutral. When using the SBBI risk measures, good performance in one two year period consistently predicts neither good nor poor performance in the subsequent two year period in the later years.

When we control for additional risk factors, all of the persistence results disappear. Using either the DFA or Wilshire indices, the two way tables never show any significant persistence, either positive or negative. The significant positive persistence found in the earlier years, which overlaps with prior studies, is eliminated. Moreover, the lack of positive persistence on average, found using the SBBI indices during 1989 to 1994, is confirmed when using the DFA and Wilshire indices. This is antithetical to the notion that winners repeat and that investors can select tomorrow's winners by selecting yesterday's winners. Table 1 supports this paper's argument that the previously documented persistence is due to insufficient risk controls. The positive persistence found in prior research

[2] Hereafter *significant* indicates significance at the 5 percent or better level in a two tailed test. The test statistic used is the log odds ratio. This is the same test used by Goetzmann and Ibbotson, although the typographical errors in their footnote #3 have not been maintained.

Table 1—Two Way Tables of Two Year Ranked Alphas*

Panel A: SBBI

Number	All Years		1985-1986		1987-1988		Sum of 1985-1988	
Row Percent	Winner	Loser	Winner	Loser	Winner	Loser	Winner	Loser
Prior Two Year	**117**	**86**	**32**	**11**	**27**	**16**	**59**	**27**
Winner	*58*	*42*	*74*	*26*	*63*	*37*	*69*	*31*
Prior Two Year	**86**	**115**	**11**	**32**	**16**	**26**	**27**	**58**
Loser	*43*	*57*	*26*	*74*	*38*	*62*	*32*	*68*
Sign p-value	Positive	.003	Positive	.000	Positive	.024	Positive	.000

Number	1989-1990		1991-1992		1993-1994		Sum of 1989-1994	
Row Percent	Winner	Loser	Winner	Loser	Winner	Loser	Winner	Loser
Prior Two Year	**20**	**21**	**13**	**26**	**25**	**12**	**58**	**59**
Winner	*49*	*51*	*33*	*67*	*68*	*32*	*50*	*50*
Prior Two Year	**21**	**20**	**26**	**13**	**12**	**24**	**59**	**57**
Loser	*51*	*49*	*67*	*33*	*33*	*67*	*51*	*49*
Sign p-value	Neutral	.825	Negative	.004	Positive	.004	Neutral	.844

Panel B: DFA

Number	All Years		1985-1986		1987-1988		Sum of 1985-1988	
Row Percent	Winner	Loser	Winner	Loser	Winner	Loser	Winner	Loser
Prior Two Year	**103**	**100**	**22**	**21**	**21**	**22**	**43**	**43**
Winner	*51*	*49*	*51*	*49*	*49*	*51*	*50*	*50*
Prior Two Year	**100**	**101**	**21**	**22**	**22**	**20**	**43**	**42**
Loser	*50*	*50*	*49*	*51*	*52*	*48*	*51*	*49*
Sign p-value	Neutral	.825	Negative	.004	Positive	.744	Neutral	.939

Number	1989-1990		1991-1992		1993-1994		Sum of 1989-1994	
Row Percent	Winner	Loser	Winner	Loser	Winner	Loser	Winner	Loser
Prior Two Year	**23**	**18**	**18**	**21**	**19**	**18**	**60**	**57**
Winner	*56*	*44*	*46*	*54*	*51*	*49*	*51*	*49*
Prior Two Year	**18**	**23**	**21**	**18**	**18**	**18**	**57**	**59**
Loser	*44*	*56*	*54*	*46*	*50*	*50*	*49*	*51*
Sign p-value	Neutral	.271	Neutral	.497	Neutral	.908	Neutral	.743

Panel C: Wilshire

Number	All Years		1985-1986		1987-1988		Sum of 1985-1988	
Row Percent	Winner	Loser	Winner	Loser	Winner	Loser	Winner	Loser
Prior Two Year	**94**	**109**	**20**	**23**	**21**	**22**	**41**	**45**
Winner	*46*	*54*	*47*	*53*	*49*	*51*	*48*	*52*
Prior Two Year	**109**	**92**	**23**	**20**	**22**	**20**	**45**	**40**
Loser	*54*	*46*	*53*	*47*	*52*	*48*	*53*	*47*
Sign p-value	Neutral	.112	Neutral	.518	Neutral	.744	Neutral	.491

Number	1989-1990		1991-1992		1993-1994		Sum of 1989-1994	
Row Percent	Winner	Loser	Winner	Loser	Winner	Loser	Winner	Loser
Prior Two Year	**19**	**22**	**19**	**20**	**15**	**22**	**53**	**64**
Winner	*46*	*54*	*49*	*51*	*41*	*59*	*45*	*55*
Prior Two Year	**22**	**19**	**20**	**19**	**22**	**14**	**64**	**52**
Loser	*54*	*46*	*51*	*49*	*61*	*39*	*55*	*45*
Sign p-value	Neutral	.508	Neutral	.821	Neutral	.081	Neutral	.132

*Number and percent of prior two year winner and loser funds that are winners or losers in the current two year period. Funds with a two year alpha greater than the median for the same period are classified as winners. The rest are classified as losers. Significant positive persistence is denoted by *positive*. Significant negative persistence is denoted by *negative*. Insignificant persistence of either type is denoted by *neutral*. P-values are based on two tailed tests (critical value = 5 percent) of the log odds ratio test. Two tailed tests are used, as we are testing for either significant positive or negative persistence

Table 2—Two Year Alpha and Expense Ratio Regressions

Panel A: SBBI

P-Value	All Years Pooled		1985-1986 vs. 1983-1984		1987-1988 vs. 1985-1986		1985-1988 Pooled	
Adjusted R^2	**0.003**	*0.208*	**0.314**	*0.000*	**0.083**	*0.011*	**0.148**	*0.000*
Persistence β	**0.067**	*0.166*	**0.604**	*0.000*	**0.159**	*0.022*	**0.332**	*0.000*
Expense Ratio β	**-0.770**	*0.330*	**4.040**	*0.037*	**-2.479**	*0.038*	**-0.345**	*0.760*

P-Value	1989-1990 vs. 1987-1988		1991-1992 vs. 1989-1990		1993-1994 vs. 1991-1992		1989-1994 Pooled	
Adjusted R^2	**-0.018**	*0.760*	**0.119**	*0.003*	**0.024**	*0.161*	**0.015**	*0.062*
Persistence β	**-0.160**	*0.502*	**-0.300**	*0.002*	**0.137**	*0.114*	**-0.148**	*0.038*
Expense Ratio β	**0.375**	*0.885*	**-2.508**	*0.164*	**-0.602**	*0.609*	**-1.509**	*0.155*

Panel B: DFA

P-Value	All Years Pooled		1985-1986 vs. 1983-1984		1987-1988 vs. 1985-1986		1985-1988 Pooled	
Adjusted R^2	**-0.003**	*0.606*	**-0.006**	*0.485*	**-0.005**	*0.447*	**0.002**	*0.840*
Persistence β	**-0.045**	*0.357*	**0.075**	*0.521*	**0.072**	*0.408*	**0.039**	*0.557*
Expense Ratio β	**-0.392**	*0.623*	**2.502**	*0.256*	**-1.440**	*0.317*	**0.121**	*0.922*

P-Value	1989-1990 vs. 1987-1988		1991-1992 vs. 1989-1990		1993-1994 vs. 1991-1992		1989-1994 Pooled	
Adjusted R^2	**0.003**	*0.164*	**0.061**	*0.035*	**-0.027**	*0.946*	**-0.001**	*0.397*
Persistence β	**0.245**	*0.198*	**-0.322**	*0.010*	**0.022**	*0.741*	**-0.094**	*0.178*
Expense Ratio β	**-1.695**	*0.459*	**-1.124**	*0.590*	**0.030**	*0.978*	**-0.412**	*0.701*

Panel C: Wilshire

P-Value	All Years Pooled		1985-1986 vs. 1983-1984		1987-1988 vs. 1985-1986		1985-1988 Pooled	
Adjusted R^2	**0.018**	*0.026*	**-0.013**	*0.629*	**0.069**	*0.020*	**0.001**	*0.350*
Persistence β	**-0.075**	*0.120*	**-0.090**	*0.376*	**0.161**	*0.025*	**0.044**	*0.463*
Expense Ratio β	**-2.124**	*0.016*	**-1.202**	*0.599*	**-1.903**	*0.123*	**-1.441**	*0.244*

P-Value	1989-1990 vs. 1987-1988		1991-1992 vs. 1989-1990		1993-1994 vs. 1991-1992		1989-1994 Pooled	
Adjusted R^2	**-0.017**	*0.723*	**0.001**	*0.362*	**0.061**	*0.042*	**0.015**	*0.062*
Persistence β	**-0.172**	*0.483*	**-0.069**	*0.543*	**-0.163**	*0.033*	**-0.140**	*0.050*
Expense Ratio β	**-1.364**	*0.617*	**-3.115**	*0.175*	**-2.470**	*0.060*	**-2.085**	*0.088*

Cross-sectional and pooled regressions of current two year alphas on prior two year alphas and expense ratios. The observations are the same as in Table 1

is more likely due to persistence in broad equity classes (macropersistence) than in managerial ability (micropersistence).[3]

While easy to understand, the two way tables only show if a fund is a winner or loser. They do not consider the magnitude of the win or loss. A regression of performance on past performance provides more useful information. Following Goetzmann and Ibbotson (1994), we regress two year alphas on the prior two year alphas. In addition to the prior period's alpha we include in the regression equation the fund's mean-adjusted expense ratio as an independent variable.[4] The regression results are shown in Table 2.

[3] The term *broad equity classes* refers to classifications based on size and style (value or growth).

[4] The mean adjustment is done by year and the type of the fund. *Type* is defined by which of four broad *Wiesenberger* investment objectives the fund fits.

Table 3—Two Way Tables of Extreme Quintiles Two Year Ranked Alphas

Panel A: SBBI

Number	All Years		Sum of 1985-1988		Sum of 1989-1994	
Row Percent	Winner	Loser	Winner	Loser	Winner	Loser
Prior Two Year	**52**	**29**	**27**	**6**	**25**	**23**
Winner	*64*	*36*	*82*	*18*	*52*	*48*
Prior Two Year	**34**	**47**	**13**	**21**	**21**	**26**
Loser	*42*	*58*	*38*	*62*	*45*	*55*
Sign p-value	Positive	.005	Positive	.001	Neutral	.471

Panel B: DFA

Number	All Years		Sum of 1985-1988		Sum of 1989-1994	
Row Percent	Winner	Loser	Winner	Loser	Winner	Loser
Prior Two Year	**46**	**35**	**19**	**14**	**27**	**21**
Winner	*57*	*43*	*58*	*42*	*56*	*44*
Prior Two Year	**41**	**40**	**17**	**17**	**24**	**23**
Loser	*51*	*49*	*50*	*50*	*51*	*49*
Sign p-value	Neutral	.431	Neutral	.532	Neutral	.612

Panel C: Wilshire

Number	All Years		Sum of 1985-1988		Sum of 1989-1994	
Row Percent	Winner	Loser	Winner	Loser	Winner	Loser
Prior Two Year	**41**	**40**	**15**	**18**	**26**	**22**
Winner	*51*	*49*	*45*	*55*	*54*	*46*
Prior Two Year	**41**	**40**	**17**	**17**	**24**	**23**
Loser	*51*	*49*	*50*	*50*	*51*	*49*
Sign p-value	Neutral	1.000	Neutral	.710	Neutral	.762

Number and percent of prior two year winner and loser funds that are a winner or loser in the current two year period. Funds with a two year alpha greater than the median for the same period are classified as winners. The rest are classified as losers. Only funds with prior two year alpha in the bottom or top quintile of their fund type in a given year are displayed. Significant positive persistence is denoted by positive. Significant negative persistence is denoted by *negative*. Insignificant persistence of either type is denoted by *neutral*. P-values are based on two tailed tests (critical value = 5 percent) of the log odds ratio test. Two tailed tests are used as we are testing for either significant positive or negative persistence

The p-values shown to the right of the adjusted R^2s are the p-values from an F-test of the significance of the overall model.

The SBBI regression results are qualitatively consistent with the previously discussed two way table results, although there are some differences in the details. Consistent with the two way tables, there is still significant positive persistence from 1985 to 1988 either on a period by period or pooled basis, and this positive persistence disappears during the 1989 to 1994 periods. It becomes significantly negative for the 1989 to 1994 pooled results, which is different from the insignificantly negative persistence found in the two way tables. Either way, the positive persistence does not reliably continue into the 1989 to 1994 period.

As with the two way tables, using the DFA equity indices uncovers no significant positive persistence in either the period by period or pooled results. In contrast to the results in the two way tables, the negative persistence in the 1991 to 1992 period is now significant. Regardless, the story is one of no reliable positive or negative persistence.

As in the two way tables when the Wilshire indices are used, there is no reliable positive persistence. There is a slight tilt toward negative persistence. There is significant positive persistence in the 1987 to 1988 period, but all the other periods show negative persistence, which indicates the positive persistence would not be a reliable strategy for

Table 4—Extreme Quintiles Two Year Alpha and Expense Ratio Regressions

Panel A: SBBI

P-Value	All Years Pooled		1985-1988 Pooled		1989-1994 Pooled	
Adjusted R^2	**-0.066**	*0.624*	**0.258**	*0.000*	**-0.004**	*0.446*
Persistence β	**0.059**	*0.356*	**0.311**	*0.000*	**-0.125**	*0.207*
Expense Ratio β	**-0.222**	*0.438*	**0.178**	*0.462*	**-0.745**	*0.353*

Panel B: DFA

P-Value	All Years Pooled		1985-1988 Pooled		1989-1994 Pooled	
Adjusted R^2	**-0.011**	*0.867*	**0.011**	*0.261*	**-0.018**	*0.835*
Persistence β	**0.007**	*0.458*	**0.098**	*0.180*	**-0.042**	*0.649*
Expense Ratio β	**0.711**	*0.297*	**2.079**	*0.134*	**0.508**	*0.393*

Panel C: Wilshire

P-Value	All Years Pooled		1985-1988 Pooled		1989-1994 Pooled	
Adjusted R^2	**0.013**	*0.136*	**-0.016**	*0.611*	**0.018**	*0.164*
Persistence β	**-0.067**	*0.144*	**0.060**	*0.365*	**-0.138**	*0.149*
Expense Ratio β	**-2.872**	*0.028*	**-0.403**	*0.423*	**-3.378**	*0.051*

Pooled regressions of current two year alphas on prior two year alphas and expense ratios. The observations are the same as in Table 3

investors. In addition, the negative persistence is significant in the 1993 to 1994 period and in the 1989 to 1994 pooled results. Therefore, as with the DFA results, there is no basis to recommend that investors purchase shares of yesterday's winning funds.

The regressions provide additional evidence in favor of the argument that the positive persistence found in the early years in this and in prior studies is due to insufficient risk controls. First, the average adjusted R^2 using the SBBI, DFA, and Wilshire indices are .104, .005, and .020 respectively. Second, the average absolute values of the persistence beta using the SBBI, DFA, and Wilshire indices are .272, .147, and .131, respectively. These patterns indicate that the richer set of risk controls more fully explain the performance patterns of mutual funds. After using the richer set of risk controls, there is no meaningful piece of performance to be explained by past performance. If you know the current two year returns on the various indices and the mutual funds' sensitivities to these indices, then knowing how the mutual fund did over the prior two years does not significantly add to your information about how well the funds should perform in the current two year period.

TWO YEAR PERFORMANCE WINDOWS—EXTREME OBSERVATIONS

In the previous section we look for persistence among all of our observations. Funds with middling performance, however, don't get a lot of press. The funds that draw the attention of investors are the outstanding performers, either outstandingly good (such as AIM Aggressive Growth or SteinRoe Capital Opportunities, or Fidelity Magellan in earlier days) or outstandingly bad (any Steadman fund or Fidelity Magellan in the present). Furthermore, if there is positive persistence, then the most money is to be made by investors chasing hot funds and avoiding the stinko ones. Therefore, in this section we look for persistence among the extreme over- and underperformers. We do this by eliminating the middle 60 percent of the sample. Specifically, we exclude the middle 60 percent

Table 5—Two Way Tables of Extreme Quintiles One Year Ranked Alphas

Panel A: SBBI

Number	All Years		Sum of 1984-1988		Sum of 1989-1994	
Row Percent	Winner	Loser	Winner	Loser	Winner	Loser
Prior Two Year	**106**	**73**	**56**	**27**	**50**	**46**
Winner	*59*	*41*	*67*	*33*	*52*	*48*
Prior Two Year	**86**	**93**	**41**	**45**	**45**	**48**
Loser	*48*	*52*	*48*	*52*	*48*	*52*
Sign p-value	Positive	.034	Positive	.010	Neutral	.611

Panel B: DFA

Number	All Years		Sum of 1984-1988		Sum of 1989-1994	
Row Percent	Winner	Loser	Winner	Loser	Winner	Loser
Prior Two Year	**87**	**92**	**36**	**47**	**51**	**45**
Winner	*49*	*51*	*43*	*57*	*53*	*47*
Prior Two Year	**89**	**90**	**47**	**39**	**42**	**51**
Loser	*50*	*50*	*55*	*45*	*45*	*55*
Sign p-value	Neutral	.833	Neutral	.143	Neutral	.274

Panel C: Wilshire

Number	All Years		Sum of 1984-1988		Sum of 1989-1994	
Row Percent	Winner	Loser	Winner	Loser	Winner	Loser
Prior Two Year	**87**	**92**	**39**	**44**	**48**	**48**
Winner	*49*	*51*	*47*	*53*	*50*	*50*
Prior Two Year	**92**	**87**	**48**	**38**	**44**	**49**
Loser	*51*	*49*	*56*	*44*	*47*	*53*
Sign p-value	Neutral	.597	Neutral	.252	Neutral	.712

Number and percent of prior one year winner and loser funds that are a winner or loser in the current one year period. Funds with a one year alpha greater than the median for the same period are classified as winners. The rest are classified as losers. Only funds with prior one year alpha in the bottom or top quintile of their fund type in a given year are displayed. Significant positive persistence is denoted by *positive*. Significant negative persistence is denoted by *negative*. Insignificant persistence of either type is denoted by *neutral*. P-values are based on two tailed tests (critical value = 5 percent) of the log odds ratio test. Two tailed tests are used, as we are testing for either significant positive or negative persistence

of alphas within each investment category and year. This leaves us with the top 20 percent and bottom 20 percent of alphas within each investment category and year.

Table 3 shows the two way tables of these extreme observations. Overall the results are consistent with the full sample results. Using the SBBI indices we find positive persistence in the early years and no persistence in the later years. Furthermore, we find no evidence of persistence in either the early or later periods when the richer DFA or Wilshire indices are used. We do not present the individual two year results, as the resulting subsamples are too small to be statistically meaningful.

The regressions in Table 4 confirm these results. Whether we look at the full sample or the quintile extremes there is no reliable and exploitable persistence in the two year fund performance numbers when the richer DFA and Wilshire risk controls are used.

ONE AND THREE YEAR PERFORMANCE WINDOWS—EXTREME OBSERVATIONS

As a robustness check of these results, we also look at persistence in one and three year performances. Table 5 presents the one year two way tables. The same patterns are seen as in the two year results. The regressions in Table 6 are slightly different. We still find significant positive persistence in the early years when using the SBBI indices. The

Table 6—Extreme Quintiles One Year Alpha and Expense Ratio Regressions

Panel A: SBBI						
P-Value	All Years Pooled		1985-1988 Pooled		1989-1994 Pooled	
Adjusted R^2	**0.035**	*0.001*	**0.069**	*0.001*	**0.024**	*0.039*
Persistence β	**0.135**	*0.002*	**0.234**	*0.000*	**0.053**	*0.177*
Expense Ratio β	**-3.381**	*0.022*	**-2.178**	*0.254*	**-4.739**	*0.011*
Panel B: DFA						
P-Value	All Years Pooled		1985-1988 Pooled		1989-1994 Pooled	
Adjusted R^2	**-0.000**	*0.383*	**0.016**	*0.094*	**0.014**	*0.096*
Persistence β	**0.032**	*0.209*	**-0.071**	*0.188*	**0.117**	*0.035*
Expense Ratio β	**-1.873**	*0.132*	**-5.363**	*0.043*	**-0.882**	*0.338*
Panel C: Wilshire						
P-Value	All Years Pooled		1985-1988 Pooled		1989-1994 Pooled	
Adjusted R^2	**0.014**	*0.028*	**0.036**	*0.017*	**0.009**	*0.160*
Persistence β	**-0.022**	*0.606*	**-0.130**	*0.022*	**0.048**	*0.447*
Expense Ratio β	**-5.415**	*0.004*	**-5.746**	*0.031*	**-4.565**	*0.054*

Pooled regressions of current one year alphas on prior one year alphas and expense ratios. The observations are the same as in Table 5

DFA and Wilshire results differ. First, when using the DFA indices we find significant positive persistence in the later years. When using the Wilshire indices we find significant negative persistence in the early years. These differences, however, do not alter our conclusions. There is no evidence of reliable and exploitable persistence. Using the SBBI indices leads to the conclusion of significant positive persistence in the all years regression, while using the other indices leads to no significant persistence in the all years regression.

Even if one year positive persistence did exist, investors would pay more in loads and taxes by switching between hot funds each year. Investors would prefer to know if there were longer-term persistence. Table 7 examines persistence in the three year performance numbers. We find no significant persistence when using any of the indices. As there are only three nonoverlapping three year periods in the entire sample, there are not enough observations to be meaningfully split into the early and late periods. Therefore only the all years results are presented. When we turn to the regression results in Table 8, the story is the same. There is no significant persistence in the three year performances when using any of the indices.

EXPENSE RATIO RESULTS

The lack of reliable positive persistence indicates that investors should not select mutual funds on the basis of past performance. Is there any observable basis upon which investors could make a decision about which fund in which to invest?[5] There is weak evidence that investors should avoid funds with high expense ratios.

First, let us return to Table 7. In the three year SBBI results there is insignificant positive persistence for winning funds. There is no positive persistence for the prior win

[5] Assuming the investor has already made his or her asset allocation decision and now is trying to choose from among similar funds.

Table 7—Two Way Tables of Extreme Quintiles Three Year Ranked Alphas

Number		SBBI All Years		DFA All Years		Wilshire All Years	
Row Percent		Winner	Loser	Winner	Loser	Winner	Loser
Prior Two Year		27	21	24	24	24	23
Winner		*56*	*44*	*50*	*50*	*51*	*49*
Prior Two Year		23	25	19	29	20	28
Loser		*48*	*52*	*40*	*60*	*42*	*58*
Sign	p-value	Neutral	.414	Neutral	.306	Neutral	.359

Number and percent of prior three year winner and loser funds that are a winner or loser in the current three year period. Funds with a three year alpha greater than the median for the same period are classified as winners. The rest are classified as losers. Only funds with prior three year alpha in the bottom or top quintile of their fund type in a given year are displayed. Significant positive persistence is denoted by ***positive***. Significant negative persistence is denoted by ***negative***. Insignificant persistence of either type is denoted by ***neutral***. P-values are based on two tailed tests (critical value = 5 percent) of the log odds ratio test. Two tailed tests are used, as we are testing for either significant positive or negative persistence

ners in the three year DFA and Wilshire results. There is some insignificant positive persistence, however, for the prior losers in the three year DFA and Wilshire results. One possible cause could be higher expenses, year after year, hurting performance, year after year. To examine this possibility we include the fund's expense ratio as an independent variable in the persistence regressions. In Table 8 we see that the expense ratio coefficient is negative for all three indices and significantly so for the SBBI index. If markets are perfectly informationally efficient, we would expect the expense ratio coefficient to be -1. Each extra dollar of analysis would return nothing and would cost shareholders a dollar.[6] If markets were economically informationally efficient, then it might be possible for funds to just earn their higher analysis costs, leading to an expense ratio coefficient of 0. Finally, if markets are informationally inefficient, then an extra dollar of analysis could lead to more than an extra dollar of return, causing a positive expense ratio coefficient. The evidence in Table 8 is consistent with markets being somewhere between perfectly and economically efficient.

The previous regression results lead to similar conclusions. The one year expense ratio coefficients in Table 6 are all negative, and some are significant. Many are absurdly negative as a result of the noisiness of one year performance numbers. As the best (worst?) example, the expense ratio coefficient in the later years for the Wilshire indices is -4.565 and yet is not significantly less than 0. The two year results in Table 4 yield a mixture of positive and negative expense ratio coefficients. The only significant coefficient is the all years negative coefficient when using the Wilshire indices. Finally, the full sample and period by period breakdown in Table 2 shows a wide range of positive and negative expense ratio coefficients. Most are negative, however, and when we use the richer (and we would argue more correct) Wilshire indices the expense ratio coefficient is negative for each two year period. Therefore, we conclude that higher expense ratio funds

[6] If higher expenses are a proxy for more trading and therefore indicate that the fund is incurring other costs such as more bid-ask spreads, then the coefficient could be expected to be more negative than -1 because the bid-ask spread is not a reported expense.

Table 8—Extreme Quintiles Three Year Alpha and Expense Ratio Regressions

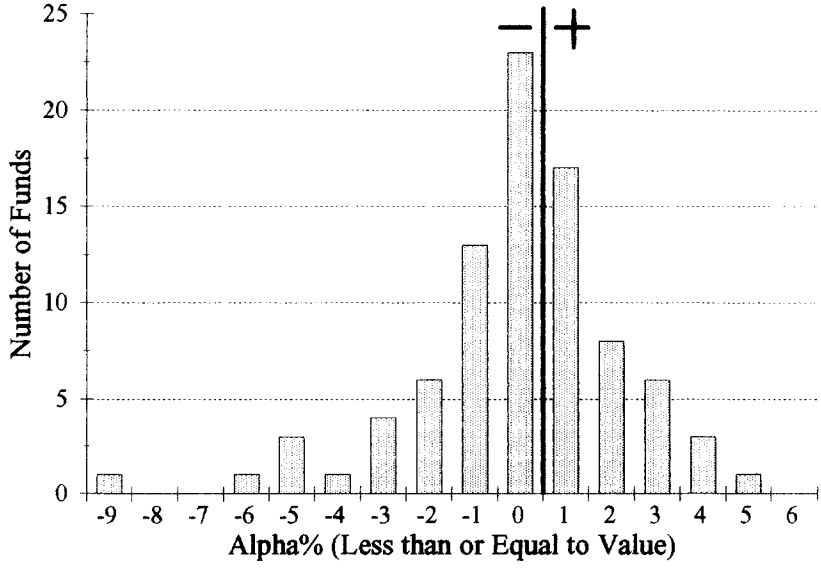
Parameter	SBBI All Years Pooled		DFA All Years Pooled		Wilshire All Years Pooled	
P-Value						
Adjusted R^2	**0.030**	*0.089*	**-0.014**	*0.602*	**0.005**	*0.292*
Persistence β	**-0.040**	*0.576*	**0.036**	*0.585*	**0.012**	*0.856*
Expense Ratio β	**-2.611**	*0.014*	**-0.684**	*0.232*	**-1.597**	*0.067*

Pooled regressions of current three year alphas on prior three year alphas and expense ratios. The observations are the same as in Table 7

don't earn their keep and could harm investor wealth. This is consistent with Elton, Gruber, Das, and Hlavka(1993). They find that alphas are not significantly related to expenses when controlling for risk with a one index model, but find that alphas are negatively related to expenses when controlling for risk with a richer three index model.

Also consistent with this conclusion, our full sample two year average annual alphas range from -40bp (using DFA equity indices) to -114bp (using Wilshire equity indices) compared to an average expense ratio of 95bp. In other words, managers underperform the indices on average, and the average expense ratio is within the bounds of the estimated

Figure 1—Distribution of Annualized Two Year Alphas Relative to SBBI Indices



The distribution is nearly identical to the alphas computed relative to the DFA and Wilshire indices (not shown). The results indicate, however, that the correlation between the year-to-year distributions of alphas, relative to the different indices, is different

verage underperformance. A fuller appreciation of the distribution of the alphas can be gleaned from Figure 1. This exhibit shows the distribution of the annualized two year alphas when we use the SBBI debt and SBBI equity indices. The alpha distributions when we use the DFA and Wilshire equity indices are similar but with smaller variances (and are therefore not shown).

CONCLUDING THOUGHTS

It appears that investors will have to be satisfied with the diversification and reduced transaction costs of mutual fund ownership. While over the observed time period many managers did beat the indices handily, many also lost. On average managers did not beat the indices. Furthermore, we find no reliable evidence of positive persistence. Therefore, we cannot advise investors that the past winners can be expected to continue their superior performance in the future. It does not appear that there is a reliable strategy for selecting funds expected to have superior future performance, other than to avoid funds with high expense ratios.

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APPENDIX—MACROPERSISTENCE

In this appendix we examine the magnitude of macropersistence in the years covered in this paper. We use the SBBI and DFA indices. Table A.1 shows the year by year returns for the two SBBI indices and four DFA indices. These returns are returns net of annual T-bill returns. All six of these indices represent either actual passive index portfolios or realistic simulations of such a passive index strategy. Therefore, any persistence found cannot be the result of managerial stock-picking ability. It only can represent persistent trends in a particular market segment.

The last four columns of Table A.1 represent the return on a DFA index less the return on a corresponding SBBI index (e.g., DFA small value - SBBI small or DFA large growth - SBBI large). It is easy to see how mutual funds with a small cap value investment objective could appear to have superior managers. From 1982 to 1990 the DFA small value index outperformed the SBBI small index each year. Similarly, from 1981 to 1986 the DFA large growth index underperformed the SBBI large index each year. This could lead investors to believe incorrectly that large cap growth funds had inferior managers.

Furthermore, a study of persistence of various mutual funds that used only the SBBI indices (or just a single equity index such as the S&P 500 or what the fund said its investment objective was) as risk controls would find strong positive persistence. The small cap growth and large cap value funds would show no performance persistence. The small cap value funds would show that winners repeat (positive persistence), while the large cap growth funds would show that losers repeat (also positive persistence). Therefore, overall such a study would find positive persistence in fund performance, and it would be particularly strong in the earlier years. This is what this paper finds when using the SBBI indices as the only risk controls.

To illustrate the magnitude of this macropersistence we run an experiment. We treat the last four columns as the alphas from four different mutual funds. Next, we regress the average two year alpha on the prior two year average alpha. This is the same procedure as

Table A.1—SBBI and DFA Excess Annual Returns

	SBBI		DFA				DFA - SBBI			
	Small	Large	Small		Large		Small		Large	
Year			Value	Growth	Value	Growth	Value	Growth	Value	Growth
1980	28.59	21.17	17.84	34.82	5.29	22.62	-10.75	6.23	-15.88	1.45
1981	-0.84	-19.63	-4.18	-18.81	-3.49	-22.62	-3.34	-17.97	16.14	-2.99
1982	17.48	10.88	27.13	15.46	16.82	7.07	9.65	-2.02	5.94	-3.81
1983	30.87	13.71	35.42	18.12	17.97	7.43	4.55	-12.75	4.26	-6.28
1984	-16.51	-3.57	-4.76	-18.71	4.23	-10.91	11.75	-2.20	7.80	-7.34
1985	16.94	24.44	27.01	20.79	21.74	23.73	10.07	3.85	-2.70	-0.71
1986	0.69	12.31	10.70	-0.34	14.20	7.54	10.01	-1.03	1.89	-4.77
1987	-14.77	-0.24	-11.77	-15.47	-3.15	0.93	3.00	-0.70	-2.91	1.17
1988	16.51	10.45	22.48	14.10	18.28	6.46	5.97	-2.41	7.83	-3.99
1989	1.80	23.11	11.31	10.71	19.97	23.14	9.51	8.91	-3.14	0.03
1990	-29.38	-10.99	-28.63	-25.95	-21.76	-6.39	0.75	3.43	-10.77	4.60
1991	39.03	24.95	33.77	46.51	24.22	35.54	-5.26	7.48	-0.73	10.59
1992	19.85	4.17	26.36	7.73	17.66	3.64	6.51	-12.12	13.49	-0.53
1993	18.08	7.09	19.66	11.14	18.26	-0.89	1.58	-6.94	11.17	-7.98
1994	-1.05	-2.60	-4.86	-6.79	-8.48	-2.44	-3.81	-5.74	-5.88	0.16

Annual returns in excess of T-bill returns for the SBBI and DFA indices. The last four columns represent the DFA index returns less the corresponding SBBI index returns

performed in Table 2, except that we have no expense ratios for our four funds (i.e., indices). The results of these regressions are reported in Table A.2. Not surprisingly, we find positive persistence overall, particularly in the early years. Yet there is no managerial ability involved, as these are passive index funds or simulations. Because we only have four funds its almost impossible to achieve statistical significance. The sign pattern of the persistence coefficients in Table A.2 is identical to the sign pattern of the persistence coefficients in Table 2. This is consistent with the idea that insufficient risk controls can lead to the appearance of mutual fund performance persistence. Moreover, regardless of which risk controls are used in Table 2 there is positive (though not necessarily significant) persistence in the pooled early years and negative (though not necessarily significant) persistence in the pooled later years. This matches the pattern seen in Table A.2 and suggests that even the Wilshire indices are not rich enough to eliminate macropersistence.

Table A.2—DFA - SBBI Differences Regressions

Parameter	All Years Pooled		1985-1986 vs. 1983-1984		1987-1988 vs. 1985-1986		1985-1988 Pooled	
P-Value								
Adjusted R^2	**-0.031**	*0.524*	**0.104**	*0.366*	**0.348**	*0.248*	**0.286**	*0.099*
Persistence β	**0.132**	*0.524*	**0.428**	*0.366*	**0.402**	*0.248*	**0.393**	*0.099*
Parameter	1989-1990 vs. 1987-1988		1991-1992 vs. 1989-1990		1993-1994 vs. 1991-1992		1989-1994 Pooled	
P-Value								
Adjusted R^2	**-0.403**	*0.746*	**0.548**	*0.164*	**0.231**	*0.302*	**-0.034**	*0.444*
Persistence β	**-0.510**	*0.746*	**-0.561**	*0.164*	**0.672**	*0.302*	**-0.283**	*0.444*

Cross sectional and pooled regressions of current two year DFA - SBBI differences on prior two year DFA - SBBI differences. Observations come from Table A.1