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Explaining Persistence in Mutual Fund Performance

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This study investigates the determinants of persistence in mutual fund performance. Previous research that uses factor-mimicking portfolios and characteristic benchmarks to model fund performance fails to explain all the persistence in fund returns. This study employs a model that directly relates mutual fund returns to the characteristics of the stocks held by funds. Adjusting fund returns for the size of the stocks in which funds invest and financial ratios intended to capture fund manager investment styles explains all the persistence in mutual fund returns from 1976–1985, the period in which persistence is most prevalent.

"Past performance is no guarantee of future results."—SEC

I. INTRODUCTION

Despite the SEC's admonition regarding investing based on past performance, studies into the behavior of mutual fund investors find that prior period returns are the most significant determinant of new money flows into mutual funds (see Carhart, 1997; Gruber, 1996; Ippolito, 1992; Lakonishok, Shleifer, & Vishny, 1992; and Patel, Zeckhauser, & Hendricks, 1992). The perception that recent performance is an important consideration in mutual fund selection is undoubtedly enhanced by the marketing methods of the funds themselves. Mutual funds devote significantly more print space to reporting their past returns than to the SEC's required warning regarding persistence-based investment strategies. This study investigates the source of persistence in mutual fund performance to help investors better understand what information is relevant when choosing a fund. The results indicate that certain characteristics of the stocks held by mutual funds explain all of the persistence in fund returns.

Mutual fund investing has enjoyed phenomenal growth in recent years. At the end of 1995, investors held almost $1.3 trillion in assets at over 2,200 domestic stock mutual

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funds. By the end of 1997, investor holdings approached $2.5 trillion (Investment Company Institute, 1998). The flow of new money into the best performing funds far surpasses new investment in funds that lag the overall market (see Carhart, 1997 and Gruber, 1996). This study investigates the underlying factors that explain the apparent "momentum" in mutual fund returns.

While most prior studies find evidence of momentum in fund returns, authors disagree regarding the source of persistence and whether persistence-based investing can generate excess returns. Brown and Goetzmann (1995) conclude that "investors can use historical information to beat the pack" (p. 697), but also find that investing based on persistence exposes investors to greater total risk than other strategies. Carhart (1997) finds that almost all the predictability in mutual fund returns is explained by common factors in stock returns and systematic differences in mutual fund expenses and transaction costs. Consistent with the findings of Carhart (1997), Daniel, Grinblatt, Titman, and Wermers (1997) conclude that actively-managed mutual funds beat mechanical trading rules based on persistence—but only by an amount equal to the average management fee. Malkiel (1995) reports that survivorship bias accounts for a significant amount of performance persistence, which implies that the returns to persistence-based investment strategies may be overstated. Golec (1996) finds a relation between mutual fund performance, risk, and fees and fund manager characteristics such as age, level of education, and length of tenure with the fund. Porter and Trifts (1998) study the performance of fund managers who manage the same fund for at least ten years. They present evidence that inferior performance is more likely to persist than superior performance.

A considerable body of research suggests that the cross-sectional pattern of stock returns can be explained by characteristics such as firm size, past returns, earnings-to-price ratios, and book-to-market ratios. Examining the effect of these variables in an integrated framework, Fama and French (1992, 1995, 1996) conclude that the cross-sectional variation in expected returns can be largely explained by only two of these characteristics, size and book-to-market equity.

A mutual fund's investment policy will tend to favor stocks of a particular size and style class (e.g., small-capitalization value stocks or large-capitalization growth stocks). If the cross-sectional returns of individual stocks can be explained by characteristics such as firm size and book-to-market equity, it is reasonable to expect that mutual fund returns can also be modeled in a similar manner. In this study, size and style characteristics are represented by market capitalization, the ratio of book-to-market equity, the ratio of earnings-to-market equity (earnings yield), and the ratio of cash flow-to-market equity (cash flow yield).

Research indicates that mutual funds tend to maintain their investment strategies over long periods of time (Malkiel, 1995). Consequently, mutual fund performance will correspond to the performance trends of the size and style classes in which funds invest. If there are periods when small stocks tend to outperform large stocks, or value stocks outperform growth stocks, then persistence in stock mutual fund returns could be due to trends in these underlying factors. This is the basis of the hypothesis tested:

H1: Mutual fund returns that have been adjusted for size and style characteristics, as well as market risk and expense ratios, will display no serial correlation.

Previous studies conclude that persistence in mutual fund returns cannot be fully explained by fund characteristics such as recent relative performance, firm size, and book-to-market equity (Carhart, 1997, Daniel et al., 1997; Gruber, 1996; and Hendricks, Patel, & Zeckhauser, 1993). Recent research suggests that these findings may be due to the use of factor-mimicking portfolios that are constructed to match the characteristics of the stocks held by a mutual fund. Daniel and Titman (1997) report that firms' actual size and book-to-market equity contain more explanatory power than time-series estimates of loadings on factor-mimicking portfolios. This study employs a model that directly relates mutual fund returns to the characteristics of the stocks held by funds. Consistent with the results reported by previous researchers, unadjusted mutual fund returns display significant persistence, as do fund returns that have been adjusted for market risk and expense ratios. However, accounting for firm size and fund manager investment styles explains all the persistence in mutual fund returns from 1976–1985, the period in which persistence is most prevalent.

II. DATA AND METHODOLOGY

The sample consists of 61 open-end equity mutual funds classified in the 1975 *Wiesenberger Investment Companies Service* as "Growth" or "Growth and Current Income." The sample was selected at random from all such funds that have returns data reported in the 1975 *Wiesenberger*. The population of "general equity" funds at year-end 1974 totaled 230 (Malkiel, 1995). Six of the 61 funds did not survive the entire sample period because they either merged with another fund or were liquidated. These funds are included in the sample until the year before they terminate. Seventy-two percent of the funds in the sample charge an up-front sales fee or "load".

Recent research attempts to explain the persistence in mutual fund performance using factor models (see Carhart, 1997 and Gruber, 1996) or benchmark portfolios designed to mimic characteristics of the component stocks held by funds (see Daniel et al., 1997). These studies conclude that differences in beta, firm size, book-to-market equity, interest rates, and prior period performance cannot fully explain the persistence in mutual fund returns. Daniel and Titman (1997) question whether factor models adequately explain the cross-section of expected stock returns. After controlling for firm characteristics, they find that expected returns are unrelated to the loadings on market, firm size, and book-to-market equity factors. They conclude that it is firm characteristics rather than covariances that determine expected returns.

Based on these findings, a model is developed that directly relates mutual fund returns to the characteristics of the stocks held by each fund. The model expresses returns in year t as a function of year $t-1$ mutual fund characteristics. Three specifications of the model are estimated:

$$R_{it} = \alpha_{1t} + \alpha_{2t}\text{Beta}_{i,\,t-1} + \alpha_{3t}\text{Exp}_{i,\,t-1} + r_{it}^{\alpha} \tag{1}$$

$$R_{it} = \beta_{1t} + \beta_{2t}\text{Beta}_{i,\,t-1} + \beta_{3t}\text{Exp}_{i,\,t-1} + \beta_{4t}\text{Size}_{i,\,t-1} + r_{it}^{\beta} \tag{2}$$

$$\begin{aligned} R_{it} = {} & \delta_{1t} + \delta_{2t}\text{Beta}_{i,\,t-1} + \delta_{3t}\text{Exp}_{i,\,t-1} + \delta_{4t}\text{Size}_{i,\,t-1} \\ & + \delta_{t-1} + \delta_{5t}B/M_{i,\,t-1} + \delta_{6t}E/M_{i,\,t-1} + \delta_{7t}CF/M_{i,\,t-1} + r_{it}^{\delta} \end{aligned} \tag{3}$$

where

t = each year 1975 through 1995;
R_{it} = total return of mutual fund i in year t;
$\text{Beta}_{i,\,t-1}$ = market risk of fund i in year $t-1$;
$\text{Exp}_{i,\,t-1}$ = expense ratio of fund i in year $t-1$;
$\text{Size}_{i,\,t-1}$ = natural logarithm of the median market capitalization of the common stocks held by mutual fund i at the end of year $t-1$;
$\text{B/M}_{i,\,t-1}$ = median ratio of book-to-market equity of the common stocks held by mutual fund i at the end of year $t-1$;
$\text{E/M}_{i,\,t-1}$ = median earnings yield of the common stocks held by mutual fund i at the end of year $t-1$; calculated as income before extraordinary items less preferred dividends divided by the market value of common stock;
$\text{CF/M}_{i,\,t-1}$ = median cash flow yield of the common stocks held by mutual fund i at the end of year $t-1$; calculated as the cash flow available to common stock divided by the market value of common stock;
α_1 to α_3, β_1 to β_2, δ_1 to δ_7 = regression parameters to be estimated (estimation methods described below);
$r_{it}^{\alpha}, r_{it}^{\beta}, r_{it}^{\delta}$ = year t characteristic-adjusted regression residuals estimated from Equations 1, 2 and 3 above.

The variables included in the above models are motivated by studies of the cross-section of stock and mutual fund returns. Each mutual fund's beta is estimated via OLS regression, using monthly returns for the 36 months preceding year t. The Center for Research in Securities Prices value-weighted index of all NYSE, AMEX, and NASDAQ stocks is used as the market proxy. Malkiel (1995), Gruber (1996), and Carhart (1997) find that mutual fund expense ratios are significant in explaining fund performance. These expense ratios are therefore obtained from *Wiesenberger* and *Morningstar Mutual Funds OnDisc* and included as an explanatory variable in the models. Firm size, measured as the natural logarithm of the median market capitalization of the stocks held by each fund, is included as a control variable. Three ratios intended to capture fund manager investment styles are also included: the median ratio of book-to-market equity (B/M) of the stocks held by each fund; the median earnings yield (E/M); and the median cash flow yield (CF/M). The stocks held by each mutual fund are identified using investment schedules reported in *Moody's Bank and Finance Manual*, Q-Data Corporation's *SEC File*, or Morningstar, Inc.'s *Mutual Fund Sourcebook* for each year $t-1$, 1974–1994. Financial data on the stocks held by each fund are obtained using Standard & Poor's *Compustat* annual files database.

Equations 1, 2, and 3 above are estimated using the stacked cross-sectional regression approach of Fama and MacBeth (1973). During the sample period 1975–1995 one cross-sectional regression is estimated for each year t. This results in 21 cross-sectional regressions, beginning with 61 observations in 1975 and ending with 55 observations in 1995 due to six non-surviving funds. The time-series means of the standardized slope coefficients from these regressions provide a basis for comparing the relative contributions of the explanatory variables in explaining mutual fund performance. Summing the squares of the slope-coefficient t-statistics yields χ^2 statistics (see Bajaj & Vijh, 1995) that test the significance of mutual fund characteristics in explaining the cross-sectional variation in annual fund returns. A significant χ^2 statistic indicates that mutual fund returns are related to the characteristics of the stocks held by each fund.

Equations 1, 2 and 3 above model mutual fund returns as a function of one or more characteristics identified in asset-pricing studies as significant in explaining the cross-sectional variation in stock returns. Thus, the residuals from these regressions r_i^{α}, r_i^{β}, r_i^{δ} may be viewed as characteristic-adjusted mutual fund returns. If the persistence in fund returns is related to these characteristics, then these adjusted returns should display less serial correlation than unadjusted mutual fund returns. Accordingly, the following models test for persistence in adjusted fund returns:

$$r_{it}^{\alpha} = c^{\alpha} + \rho^{\alpha} r_{i,t-1}^{\alpha} + \varepsilon_{it}^{\alpha} \quad (4)$$

$$r_{it}^{\beta} = c^{\beta} + \rho^{\beta} r_{i,t-1}^{\beta} + \varepsilon_{it}^{\beta} \quad (5)$$

$$r_{it}^{\delta} = c^{\delta} + \rho^{\delta} r_{i,t-1}^{\delta} + \varepsilon_{it}^{\delta} \quad (6)$$

where

$r_{it}^{\alpha}, r_{it}^{\beta}, r_{it}^{\delta}$ = year t characteristic-adjusted returns of fund i estimated from Equations 1, 2 and 3 above;

$\rho^{\alpha}, \rho^{\beta}, \rho^{\delta}$ = first-order serial correlation coefficients;

$\varepsilon_{it}^{\alpha}, \varepsilon_{it}^{\beta}, \varepsilon_{it}^{\delta}$ = year t regression residuals estimated from Equations 4, 5, and 6.

If the size and style characteristics in Equations 1, 2, and 3 explain the persistence in mutual fund performance, there will be no serial correlation between adjusted fund returns in year t and year $t-1$, and the ρ-coefficients will be insignificantly different from zero. Finding no serial correlation supports the hypothesis that the characteristics of stocks held by funds explain the persistence in mutual fund returns.

III. EMPIRICAL RESULTS

Table 1 reports average descriptive statistics for the funds in the sample over the period 1975–1995. There is considerable variation among fund characteristics. For example, mutual fund market risk (beta) ranges from 0.50 to 1.60. The average expense ratios display substantial variation as well, ranging from 0.30 percent to 1.88 percent of net assets. The size and style characteristics of the stocks held by funds in the sample also differ considerably. The mean market value of the stocks in each fund ranges from $66 million to $8.1 billion, while the mean book-to-market ratio ranges from 0.20 to 0.98. The sample includes funds with preferences for both small and large stocks as well as growth and value investing. The average annual total return of the funds in the sample varies widely, ranging from −2.4 to 41.1 percent.

Table 2 reports results from the three characteristic-model regressions (Equations 1, 2, and 3). The results suggest that the characteristics of the stocks held by mutual funds are useful in explaining annual fund returns. Across all three models, mutual fund returns are positively related to beta at the one percent level. Mutual fund expense ratios are also sig-

TABLE 1
Sample Descriptive Statistics

	Return	*Mkt Cap*	*B/M*	*E/M*	*CF/M*	*Beta*	*Exp*	*Net Assets*
Mean	16.9	2680	0.55	0.08	0.14	1.04	0.95	453.48
Minimum	−2.4	66	0.25	0.05	0.06	0.50	0.30	12.33
1st Quartile	11.2	1112	0.40	0.07	0.10	0.90	0.70	56.97
Median	16.1	2468	0.52	0.08	0.14	1.00	0.93	156.11
3rd Quartile	21.9	3924	0.67	0.09	0.17	1.20	1.14	378.57
Maximum	41.1	8137	0.98	0.12	0.23	1.60	1.88	4999.60
Standard Deviation	8.8	1970	0.18	0.02	0.04	0.21	0.32	909.0

Notes: This table reports descriptive statistics for the sample of 61 mutual funds. Average statistics are reported for each fund using annual data from 1975–1995. Variable definitions are given at the bottom of the table.

Definition of Variables:

Return = Total return (percent) during each year t;
Beta = Mutual fund market risk estimated over the thirty-six months ending with each year $t-1$;
Exp = Expense ratio in each year;
Mkt Cap = *Median* market value (millions of dollars) of the common stocks held at the end of each year;
B/M = *Median* book value-to-market value of the common stocks held at the end of each year;
E/M = *Median* earnings yield of the common stocks held at the end of each year; *earnings yield* is income before extraordinary items less preferred dividends divided by common stock market value;
CF/M = *Median* cash flow yield of the common stocks held at the end of each year; *cash flow yield* is cash flow available to common stock divided by common stock market value.
Net Assets = Mutual fund net assets (in millions of dollars) at the end of each year.

nificant in explaining fund returns. Although the incomplete specification in model 1 yields an unexpected positive coefficient, the more complete specifications of models 2 and 3 produce the expected negative coefficient (significant at the five percent level). Model 2 also includes the natural logarithm of the median market capitalization of the stocks in each fund (Size) as an explanatory variable. Size displays the expected negative coefficient and is significant at the one percent level. The Size variable improves the explanatory power of the model, with the average adjusted R^2 increasing from 15 to 30 percent.

Model 3 incorporates the median values of three financial statement ratios intended to capture fund manager investment style: book-to-market (B/M), earnings-to-market (E/M), and cash flow-to-market (CF/M). While B/M and E/M display the expected positive coefficient, CF/M is insignificant in the regression. The E/M and B/M variables are significant at the one percent level. The adjusted R^2 of 42 percent indicates that inclusion of these variables substantially improves the fit of the model. These findings provide support for the idea that annual mutual fund returns are related to the size and style characteristics of the stocks held by funds.

Table 3 reports average serial correlation coefficients between mutual fund returns in years t and $t-1$. The correlations are estimated using the models shown in Equations 4, 5, and 6. Results are reported for both raw mutual fund returns and for fund returns that have been adjusted for fund size and style characteristics using the regression models shown in Equations 1, 2, and 3. Panel A of Table 3 reports results for the period 1976–1995, while Panels B and C report results for the 1976–1985 and 1986–1995 periods, respectively.

The results reported in Panel A show that, for the entire 20-year period, the mean annual serial correlation coefficient from year-by-year regressions of unadjusted fund returns in year t on year $t-1$ returns is 0.12. The related t-statistic is 1.62, which is signif-

TABLE 2

Time-Series Means of Cross-Sectional Regression Standardized Coefficients

Model	*Coefficient*	*Intercept*	*Beta*	*Exp*	*Size*	*B/M*	*E/M*	*CF/M*	*Adj.* R^2
1	Mean	7.77	0.10	0.01					0.15
	χ^2	234.73**	235.02**	62.91**					
	t-statistic	2.26*	1.27	0.24					
2	Mean	22.21	0.06	−0.05	−0.14				0.30
	χ^2	240.01**	179.58**	31.69*	405.65**				
	t-statistic	3.33**	0.83	−1.46	−1.34				
3	Mean	16.72	0.13	−0.04	−0.11	0.03	0.10	−0.01	0.42
	χ^2	175.80**	94.04**	32.18*	305.04**	56.74**	67.48**	27.98	
	t-statistic	2.12*	2.80**	−1.32	−1.18	0.33	1.13	−0.14	

Notes: This table reports results from the regression models shown in Equations 1, 2 and 3, which model annual mutual fund returns as a function of the characteristics of the stocks held by each fund in a given year:

$$R_{it} = \alpha_{1t} + \alpha_{2t}\text{Beta}_{i,\,t-1} + \alpha_{3t}\text{Exp}_{i,\,t-1} + r_i^{\alpha} \tag{1}$$

$$R_{it} = \beta_{1t} + \beta_{2t}\text{Beta}_{i,\,t-1} + \beta_{3t}\text{Exp}_{i,\,t-1} + \beta_{4t}\text{Size} + r_{it}^{\beta} \tag{2}$$

$$R_{it} = \delta_{1t} + \delta_{2t}\text{Beta}_{i,\,t-1} + \delta_{3t}\text{Exp}_{i,\,t-1} + \delta_{4t}\text{Size}_{i,\,t-1} + \delta_{i,\,t-1} + \delta_{5t}B/M_{i,\,t-1} + \delta_{6t}E/M_{i,\,t-1} + \delta_{7t}CF/M_{i,\,t-1} + r_{it}^{\delta} \tag{3}$$

Twenty-one cross-sectional regressions are estimated (one for each year 1975–1995). The regression coefficients reported are calculated as the time-series means of the cross-sectional regression standardized coefficients. (The regression intercepts do not have standardized coefficients, and are therefore reported in unstandardized form.) The χ^2 statistics are obtained by summing the squares of the regression coefficient *t*-statistics. A significant χ^2 value indicates that the variable is significant in explaining mutual fund returns. The R^2s are calculated as the time-series mean adjusted-R^2s from all cross-sectional regressions. The *t*-statistics are calculated as the slope coefficient time-series means divided by the time-series standard errors.

**, * Significant at the one and five percent levels, respectively.

Definition of Variables:

R_{it} = total return of mutual fund *i* in year *t*;
$\text{Beta}_{i,\,t-1}$ = market risk of fund *i* in year $t-1$;
$\text{Exp}_{i,\,t-1}$ = expense ratio of fund *i* in year $t-1$;
$\text{Size}_{i,\,t-1}$ = natural logarithm of the median market capitalization of the common stocks held by mutual fund *i* at the end of year $t-1$;
$\text{B/M}_{i,\,t-1}$ = median ratio of book-to-market equity of the common stocks held by mutual fund *i* at the end of year $t-1$;
$\text{E/M}_{i,\,t-1}$ = median earnings yield of the common stocks held by mutual fund *i* at the end of year $t-1$; calculated as income before extraordinary items less preferred dividends divided by the market value of common stock;
$\text{CF/M}_{i,\,t-1}$ = median cash flow yield of the common stocks held by mutual fund *i* at the end of year $t-1$; calculated as the cash flow available to common stock divided by the market value of common stock.

icant at the ten percent level. Mutual fund returns display only mild persistence over the entire period 1976–1995.

The persistence in fund returns that have been adjusted for market risk and expense ratios (r_{it}^{α}) are examined next. The average first-order serial correlation coefficient for beta- and expense-adjusted returns increases slightly, from 0.12 to 0.15. The *t*-statistic on the mean of the ρ^{α}-coefficients from Equation 4 is 2.63, indicating that these correlations are, on average, significantly greater than zero. Consistent with the findings reported by Brown and Goetzmann (1995, pp. 691–693), adjusting mutual fund returns for market risk and expense ratios does not explain the persistence in fund returns.

The next average serial correlation coefficient reported in Table 3 is from fund returns that have been adjusted for beta, expenses, and the median size of the stocks held by each fund (r_{it}^{β}). The year-by-year persistence in mutual fund returns is reduced by inclusion of

TABLE 3
First-Order Serial Correlation Coefficients of Adjusted Mutual Fund Returns

Model	*Variables in Performance-Characteristics Models 1, 2, and 3*	*Parameter*	*Value*
Panel A: 1976-1995			
	Unadjusted Mutual Fund Returns	ρ	0.12
		t-statistic	1.62§
4	Beta, Exp	ρ^{α}	0.15
		t-statistic	2.63**
5	Beta, Exp, Size	ρ^{β}	0.11
		t-statistic	1.62§
6	Beta, Exp, Size, B/M, E/M, CF/M	ρ^{δ}	0.06
		t-statistic	1.25
Panel B: 1976-1985			
	Unadjusted Mutual Fund Returns	ρ	0.24
		t-statistic	2.46**
4	Beta, Exp	ρ^{α}	0.19
		t-statistic	2.89**
5	Beta, Exp, Size	ρ^{β}	0.10
		t-statistic	1.51
6	Beta, Exp, Size, B/M, E/M, CF/M	ρ^{δ}	0.03
		t-statistic	1.02
Panel C: 1986-1995			
	Unadjusted Mutual Fund Returns	ρ	–0.01
		t-statistic	–0.06
4	Beta, Exp	ρ^{α}	0.12
		t-statistic	1.12
5	Beta, Exp, Size	ρ^{β}	0.12
		t-statistic	0.99
6	Beta, Exp, Size, B/M, E/M, CF/M	ρ^{δ}	0.09
		t-statistic	0.99

Notes: This table reports results from the regression models shown in Equations 4, 5, and 6, which regress adjusted annual mutual fund returns on lagged adjusted fund returns (the regression residuals obtained from estimating Equations 1, 2, and 3):

$$r_{it}^{\alpha} = c^{\alpha} + \rho^{\alpha} r_{i,t-1}^{\alpha} + \varepsilon_{it}^{\alpha} \tag{4}$$

$$r_{it}^{\beta} = c^{\beta} + \rho^{\beta} r_{i,t-1}^{\beta} + \varepsilon_{it}^{\beta} \tag{5}$$

$$r_{it}^{\delta} = c^{\delta} + \rho^{\delta} r_{i,t-1}^{\delta} + \varepsilon_{it}^{\delta} \tag{6}$$

The average first-order serial correlation coefficients from adjusted mutual fund returns are compared to the average serial correlation coefficient from unadjusted fund returns. Finding that the adjustment regressions (Equations 1, 2, and 3) decrease the serial correlation in fund returns supports the hypothesis that the characteristics of the stocks held by funds explains the persistence in mutual fund returns. The first-order serial correlation coefficients reported are calculated as the time-series means from all cross-sectional regressions. The *t*-statistics are calculated as the slope coefficient time-series means divided by the time-series standard errors.

**, * Significant at the one and five percent levels, respectively.

§ Significant at the ten percent level.

Definition of Variables:

$r_{it}^{\alpha}, r_{it}^{\beta}, r_{it}^{\delta}$ = year *t* characteristic-adjusted returns of fund *i* estimated from Equations 1, 2 and 3 above;

$\rho^{\alpha}, \rho^{\beta}, \rho^{\delta}$ = first-order serial correlation coefficients;

$\varepsilon_{it}^{\alpha}, \varepsilon_{it}^{\beta}, \varepsilon_{it}^{\delta}$ = year *t* regression residuals estimated from Equations 4, 5, and 6.

the size variable. The mean correlation between annual fund returns declines from 0.15 in model 4 to 0.11 in model 5. The related t-statistic is 1.62, which indicates that adjusting annual fund returns in this manner explains only a small amount of the persistence in fund returns.

The final results reported in Panel A of Table 3 are from estimation of Equation 6, which examines the correlations between annual fund returns adjusted for beta, expenses, firm size, and the three characteristic ratios B/M, E/M, and CF/M. The average of the year-by-year correlations between fund returns adjusted as such is 0.06. The t-statistic on the ρ^{δ}-coefficients from Equation 6 is 1.25, indicating that on average these correlations are insignificantly different from zero. Despite the mild persistence in fund returns over the 1976–1995 period, there is a significant reduction in persistence after adjusting for beta, expense ratios, firm size and investment style. These results provide support for the hypothesis that accounting for the size and style characteristics of the stocks held by funds using the more parsimonious and direct methods suggested by Daniel and Titman (1997) can fully explain the persistence in mutual fund returns.

Previous research into mutual fund persistence finds that "the strongest evidence for repeat performance is over the late 1970s and early 1980s" (Brown & Goetzmann, 1995, p. 689). For this reason persistence coefficients are reported for the 1976–1985 and 1986–1995 subperiods in Panels B and C of Table 3. Consistent with the findings of previous researchers (Brown & Goetzmann, 1995; Hendricks et al., 1993; and Malkiel, 1995), unadjusted mutual fund returns display strong persistence in the 1976–1985 period ($\rho = 0.238$, $t = 2.46$). The average first-order serial correlation coefficient for beta- and expense-adjusted returns (model 4) decreases only slightly, from 0.24 to 0.19. The t-statistic on the mean of the ρ^{α}-coefficients from model 4 is 2.89, indicating that these correlations remain significantly greater than zero. As was the case in Panel A, adjusting mutual fund returns for market risk and expense ratios does not explain a significant amount of the persistence in fund returns. Moving from model 4 to model 5 in Panel B reveals that including the size variable in the model reduces the average fund persistence coefficient from 0.19 to 0.10. Inclusion of the investment style variables B/M, E/M, and CF/M further reduces the year-by-year persistence coefficients to 0.03 (see model 6). The t-statistic of 1.02 is insignificantly different from zero, which indicates that accounting for the size and style characteristics of the stocks held by funds using more direct and parsimonious modeling methods explains all the persistence in fund returns for the 1976–1985 period.

The results reported in Panel C of Table 3, covering the period 1986–1995, demonstrate why the characteristics model explains more of the persistence in mutual fund returns from 1976–1985 than for the entire 20-year period (Panel A). Confirming the findings of previous studies, there is virtually no persistence in fund returns after 1985. None of the persistence coefficients reported in Panel C are significant at conventional levels.

IV. CONCLUSIONS AND IMPLICATIONS

This study investigates the factors contributing to persistence in mutual fund performance. The particular hypothesis tested is that a greater amount of the persistence in mutual fund returns can be explained than has been found by previous researchers (Carhart, 1997; Daniel et al., 1997; and Gruber, 1996). Motivated by recent studies into the cross-section of expected stock returns (Daniel & Titman, 1997), a model is developed that avoids the use of factor-mimicking portfolios and characteristic benchmarks and instead directly relates mutual fund returns to the properties of the stocks held by funds.

Consistent with the results reported by previous studies, market risk and fund expense ratios explain only a small amount of the momentum in mutual fund returns. Examining the period in which mutual fund return persistence has been most pronounced (1975–1986), however, the results indicate that accounting for the size of the stocks held by funds and fund manager investment styles (characterized by ratios such as book-to-market, earnings-to-market, and cash flow-to-market) explains all of the persistence in mutual fund returns. Both firm size and investment style characteristics contribute to explaining persistence. As found by previous studies, there is little evidence of momentum in fund returns during the late 1980s and early 1990s.

These findings suggest that investors interested in allocating money among mutual funds would be wise to consider more than recent past performance. Investors should also take into account recent trends in the overall stock market, such as whether large company stocks are outperforming small company stocks and whether value stocks are outperforming growth stocks. The persistence in fund performance appears to be driven almost entirely by trends in these well-known and widely-publicized investment categories. In other words, instead of simply buying the best-performing funds from prior periods, investors should identify the size and style characteristics of funds and research current market trends in these factors. During periods when large-capitalization stocks begin outperforming smaller stocks, buying funds that invest in larger stocks should also produce superior results. Similarly, recent trends in value and growth stocks should be reflected in the relative performance of funds that invest according to these criteria.

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