

Mutual fund performance, management behavior, and investor costs

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Abstract

We examine pure no-load funds over a 5-year period. For equity funds, trading activity is negatively related to returns. Expense ratios are not significantly related to returns. Potential capital gains exposure and tax cost ratio are positively related to return. For fixed income funds, trading activity is positively related to return. Expense ratios and tax cost ratios are negatively related to returns. Mutual funds exhibit economies of scale and managers experience scale and scope economies. The individual investor is better off in a large fund that is a member of a large fund family. © 2004 Academy of Financial Services. All rights reserved.

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1. Introduction

There are a wide variety of investment companies the avowed purpose of which is to serve the needs of both individual and institutional investors. Within the category of “pure no load” funds Morningstar identifies 36 different “prospectus objectives” ranging from “aggressive growth” to municipal bond funds specializing in bonds issued within a particular state. The “efficient markets” reason for investors to utilize mutual funds as investment vehicles is that they provide a relatively low cost way to achieve a well-diversified portfolio, along with the

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“benefits” of professional management. If professional managers are unable to produce superior after tax returns then the individual investor would be better served by the creation of portfolios that track broad market indexes.

In order to manage the shareholders’ money, the fund management must trade securities. Trading securities incurs a number of costs that affect the profitability of a transaction. Among these are direct brokerage costs and the effect of the bid/ask spread on purchase or sale price which are not reflected in the funds expense ratio. The trading efficiency of a fund manager is impacted by these costs. Since trading is costly, funds should only trade when it is advantageous to the shareholder. One view is that the managers who are less successful at generating returns will do more trading in an effort to make up lost ground. Such an effort, if unsuccessful, will only generate more trading costs. We examine the relation between managers’ ability to generate returns and the amount of trading they do.

Investors take the risk that the managers to whom they entrust their funds may underperform the market on a risk-adjusted basis. Investors must pay the managers and the expenses of operating the fund. Efficient managers should be able to operate a fund at a lower cost. We examine the relation between the cost of operating the fund and the returns generated by the fund.

In addition to the management fee, investors holding money in accounts that are not tax deferred must also pay taxes as taxable events occur. Since taxes are an expense of the shareholder that reduces return, it is incumbent upon managers to operate the fund in a tax-efficient manner. If a taxable fund is earning returns, investors who are not in tax deferred accounts such as the 401k or the IRA, will be incurring tax costs. The fact that some investors are in fully taxable accounts and some investors are in tax deferred accounts creates a dilemma for fund managers.

A new measure of potential future tax liability required by the Securities and Exchange Commission (SEC) is the Potential Capital Gains Exposure (PCGE). If the assets in a fund appreciate, the investor may sell shares in the fund and pay the tax on the capital gain. Alternatively, the management of the fund could choose to sell some component of the appreciated assets of the fund. If management makes that decision, the capital gain will then be distributed to the shareholders and they will be required to pay tax on that gain regardless of their personal tax situations. PCGE provides potential new investors with a measure of the possible future tax exposure from such transactions. PCGE does the same for existing shareholders, but until management sells the appreciated assets those investors have the tax option to sell their shares in accordance with their personal tax planning. We test whether PCGE is related to the returns generated by the fund.

Another aspect of tax efficiency for a mutual fund is the receipt of taxable interest and dividends by the fund. Such receipt produces a taxable event for the investor. It is the responsibility of the fund’s management to conduct the affairs of the fund so as to insure that the investor does not incur an unwarranted tax liability. We examine the relation between tax costs and the ability of fund management to generate returns.

Most mutual funds, particularly large mutual funds, are members of fund families. Fund families vary considerably both in the number of funds under management and in the total assets under management. Malhotra and McLeod (1997) examined an aspect of this issue by using a dummy variable equal to one if a fund was a member of a family with at least five

funds under management and zero otherwise. They found that being a member of a large fund family reduced a funds expense ratio. We extend their work by examining both economies of scale associated with the total money under management and economies of scope associated with the number of funds under management.

2. Literature review

Ang, Chen, and Lin (1998) explored equity mutual fund management reaction to poor performance using data beginning in 1994. They observed that management had good reason to be concerned about poor performance, as management compensation is based upon the amount of money under management and performance of the fund. Their analysis explores possible management reactions to poor performance. Management could trade more often, reduce costs, take more risks, or adopt a more aggressive marketing strategy. They found that the management of lower performing funds did more trading and had greater expense ratios than the management of funds that had good performance. We examine these issues and contribute to the understanding of mutual fund performance by studying a later time period with a larger sample and by including fixed income as well as equity funds. We also contribute by considering the role of economies of scale both at the level of the individual fund and the level of the fund family.

Berkowitz and Kotowitz (2002) found that there is a relationship between the fees, the structure of the fees charged by asset managers, and the level of the funds performance. We build on and support these findings.

Droms and Walker (2001), studying 151 mutual funds over a 20-year period found no long-term persistence in returns, expenses, or turnover rates. They examine a longer time period than this study, but a smaller sample of investment companies. Their findings could support various explanations. Changes in returns, expenses, and turnover rate could be due to changes in fund management or management philosophy. The findings are also consistent the possibility that the quality of oversight from the independent trustees varies over time.

Malhotra and McLeod (1997) argue that investors ignore aspects of fund management other than performance. They also argue that this behavior is suboptimal in that net performance after consideration of fees and taxes is a more appropriate measure. We find that fund expenses and tax costs do significantly reduce returns. We find that tax costs are of greater magnitude than the costs of managing the fund.

3. Hypotheses

H1: Trading activity is unrelated to market performance

The trading activity of a fund may be linked to the market performance of the fund because of the link between the amount of money under management and the compensation of the managers. In the mutual fund industry, there are various compensation schemes, some based on performance and some based on a proportion of funds under management. Golec

(2003) found that 2190 of the 2351 equity mutual funds that he studied, using 1995 data, charged fees strictly as a percentage of assets, and only 39 funds utilized performance-based fees. Golec argued that the primary reason for this was that the SEC had made other compensation schemes either illegal or unattractive. He found this to be significant because individual investors have difficulty distinguishing between investor-oriented funds that minimize costs and marketing oriented funds that pursue other strategies to increase the level of the assets.

Even managers of funds with no performance-based compensation will be concerned about performance because negative portfolio returns generally result in decreased income to management, since the net assets in the fund will fall due to the poor performance. For a fund with positive but below average returns income to management will not increase as fast as income to the management of funds with above average returns. In addition, there may be negative cash inflows as investors reallocate their money to better performing funds. Therefore the managers with negative or below average performance will have a strong motivation to improve performance, or to at least appear to be working to improve the performance. One way in which they can try to improve performance, or create the appearance of doing something to improve performance, is to increase the amount of trading. Therefore it is expected that poorly performing funds will trade more frequently than funds with good performance as managers attempt to improve performance.

Assets under management increase for two reasons. The first is performance. If there is positive performance the assets will grow in an amount proportional to the performance. The second is net cash inflow. The firms marketing efforts, which are greatly influenced by the performance, determine net cash inflow. In general, the better the performance the greater the cash inflow and the greater the compensation to management. The less management feels the need to increase trading activity.

H2: There is no relation between performance and expense ratio

Operating a mutual fund is a costly undertaking. Management must be compensated. Custodial and transfer agency fees must be paid. Investment research must be conducted. All of these result in a reduction of the return available to shareholders. Shareholders have a strong interest in knowing that their fund is operated as efficiently as possible. It is expected that the better performing funds will have lower expense ratios.

H3: Poorly performing funds will have the same potential capital gain exposure as funds with good performance

Effective April 16, 2001 the SEC requires funds to report potential capital gains exposure. If management chooses to sell all appreciated assets, PCGE represents the potential taxable capital gain that the fund could realize and force investors to recognize on their income taxes. The justification given for the requirement by the SEC was that unrecognized capital gains would be recognized in future time periods creating taxable capital gain distributions for the shareholders of the fund. Contrary to the justification for the SEC ruling, the existence of positive potential capital gain exposure actually represents cumulative gain in unsold assets

and past positive performance on the part of the fund, and a tax option for the shareholder. The shareholder has a valuable tax option in that a choice can be made to recognize the capital gain in the current period by selling the appreciated shares of the fund. Alternatively, the shareholder can hold on to the appreciated shares and allow fund management to continue to manage the money. It is expected that the poorly performing funds will have more negative potential capital gain exposure consistent with the poor performance. Even negative PCGE provides the investor with a valuable tax option in that capital losses from selling the shares of the fund can produce tax savings at an advantageous time for the investor. The investor can control the timing of the sale of shares of the fund and the associated taxes. The investor cannot control the timing of the sale of the assets contained in the fund. Management must have good reason to sell appreciated assets, as the sale removes a valuable tax option from the shareholder unless the gain is offset by the sale of depreciated assets. Potential capital gains exposure actually represents a measure of the cumulative success of fund management in managing the fund. A positive relation between returns and PCGE is expected.

H4: There is no relation between tax costs and returns

We expect that the tax costs associated with poorly performing funds will be less than that of the funds that do well, in that the poorly performing funds will produce a smaller income stream with fewer taxable events. Managers should manage in a tax efficient manner realizing that an investor will prefer a fund with successful management even though it may produce tax liabilities.

H5: There is no relation between expenses and the total of assets under management by a fund family

Professional management groups manage all mutual funds. These management groups are of various sizes, as are the mutual funds that they manage. Latzko (1999), using a translog cost function found that mutual funds experienced economies of scale up to \$3.5 billion in assets. Beyond that level, Latzko found that economies of scale are exhausted. Scale economies are exhibited in any industry when the fixed costs of running the firm can be allocated over a larger plant size or, in the case of mutual fund management groups, over more dollars of assets under management. If there are fixed costs associated with running mutual funds, then the more assets over which those costs can be allocated the lower will be the expense ratio. Consistent with Malhotra and McLeod, we expect that the sample will exhibit scale economies.

H6: There is no relation between expenses and the total number of different mutual funds included in a fund group

Economies of scope occur when a firm is able to allocate fixed costs over more than one product. A classic example of an economy of scope is corn and pig production. A farmer can easily combine these two products because a portion of the corn produced can be used to feed the pigs, eliminating transportation and processing costs, including accounting profit for the

feed wholesaler. The use of the corn in this manner allows the farmer to produce pigs at lower cost. The use of the pigs reduces some of the demand uncertainty faced by the farmer at the time of planting, thus reducing the cost of hedging the corn price. The question here is whether mutual fund management groups experience similar economies of scope. Given the proliferation of mutual funds under one management group it is expected that there will be a negative relation between cost and the number of different funds under management.

4. Data and methodology

Data for this study comes from the Morningstar Principia Mutual Fund database with data last updated on March 31, 2003. This analysis examines “pure no load” mutual funds where Morningstar has indentified 36 different “prospectus objectives” ranging from “aggressive growth” to municipal bond funds specializing in the bonds issued within a particular state. The Morningstar criteria include the requirement that no 12b-1 fee be charged by the fund. Only no load funds are used because of the complexity of the variety of loads now charged.

Fund performance is measured by average annual return over the previous 5 years as calculated by Morningstar. That measure consists of ending net asset value per share plus any distributions that were available for reinvestment divided by beginning net asset value per share. One is subtracted from this quotient and the result is stated as a percentage. The 5-year measure is chosen because it is relatively long term.

The measure of trading activity used in the study is “turnover” as calculated by Morningstar. Turnover is the lesser of the total dollar volume of shares purchased or sold, excluding all securities with a maturity of less than 1 year, over a time period divided by the average net asset value in the time period. By this definition, a fund that is experiencing only cash inflows and only buying securities would have sales of zero and report a zero turnover. Overall, the average turnover rate for the funds is 109.80% of assets. This does not mean that the fund sold all of the assets that it started with; it means only, that in the time period, it purchased or sold, (whichever was less) a dollar volume of assets equal to 109.80% of the average net asset value.

The funds’ expenses are measured by the expense ratios reported by Morningstar. Morningstar does not calculate the expense ratios but rather reports the expense ratios that the funds report in the prospectuses. The expense ratio includes operating expenses, management fees and would, for load funds, include 12b-1 fees. The average expense ratio reported for all of the funds is 0.98% of assets. The highest average expense ratio is 1.86%, reported for the aggressive growth funds, and the lowest was 0.58% for the California Municipal Bond Funds.

The number reported by the funds in their respective prospectuses measures PCGE. While PCGE is designed to provide investors with an estimate of the amount on which they might have to pay capital gains taxes in the future, in fact the average potential capital gains exposure is –36.56%. The lowest reported PCGE is for the specialty technology funds with –323.86%. A negative number of this magnitude can result because ending net assets are used as the denominator. For example, start with \$100 in assets and end with unrecognized

losses of \$80. Your net asset value is now \$20 and your potential capital gains exposure is $(-\$80/\$20) \times 100 = -400\%$. The greatest potential capital gains exposure is for California municipal bond funds with 6.94%.

The tax costs are measured using the Morningstar tax cost ratio for the 5-year period. The 5-year period is chosen to be consistent with the performance measure used. The tax cost ratio represents the reduction in annualized return that would result from income taxes if the fund management realized all gains, did not realize any losses, and the individual investor paid tax at the highest statutory rate. The ratio does not include the taxes incurred by the individual investor for selling shares of the fund. It does include the hypothetical tax that an investor in the maximum federal tax bracket would pay on dividend, interest, and capital gain distributions. For the funds as a whole the average tax cost ratio is 1.48%, which is substantially larger than the expense ratio. The largest tax cost ratio is 3.74% for high-yield corporate bonds and the smallest is 0.05% for California municipal bond funds.

After elimination of all mutual funds missing relevant data, the sample consists of 3292 funds managed by 408 fund complexes. Summary data for the overall sample and for each of the different objectives is contained in Table 1. The smallest objective category, Specialty–Unaligned, contains only nine funds. The largest objective category, Growth, contains 651 funds. Across all funds, management expenses average 0.98% of assets and tax costs average 1.48% of assets. There is substantial variation in these numbers across different investment objectives.

Table 2 presents data on the funds, broken down by equity and fixed income and divided into size deciles based on total net assets in the fund. For the equity investment companies the funds under management in the largest decile constitute nearly three fourths of the total assets of the equity funds. The returns for the funds increase and the expense ratios decrease as size of fund increases, indicating the presence of economies of scale. Turnover decreases as funds get larger. Overall, there appears to be strong market concentration in the mutual fund industry that may relate to scale economies.

For the fixed income mutual funds, the largest ten percentage of funds control over 65% of the assets being managed. Returns increase as the size increases and the expense ratio decreases indicating economies of scale.

Table 3 considers the issue of the total assets under management by a single manager. Since fund managers run both equity and fixed income funds and economies of scale and scope may affect both of these types of funds, there was no attempt to break out the equity from the fixed income funds. The largest ten percentage of fund families control 82.5% of the assets under management and 42.63% of the total number of individual funds. The relation between return and size for fund families is not monotonic. However, the expense ratio does generally decrease as size increases, indicating that there may be both economies of scale and of scope.

The tests of H1 through H4 are conducted using regression analysis. the following regression models are used:

To test H1:

$$Turn_i = \alpha + \beta_1(Return_i) + b_2(Assets_i) + \epsilon_i \quad 1,$$

Table 1
 Characteristics of the overall sample and mutual funds by prospectus objective

Pros. Obj.	Number	Avg. Ann. Tot. Return last 5 Years	Turnover	Expense Ratio	PCGE	Tax Ratio Last Five Years
Overall	3291	-.01%	109.80%	.98%	-36.56%	1.48%
Agg. Growth	50	-4.81%	145.14%	1.86%	-90.16%	1.39%
Ass. Allocation	98	.78%	103.24%	.90%	-32.57%	1.86%
Balanced	141	.02%	93.51%	.91%	-26.34%	1.85%
Convert. Bond	14	1.06%	99.42%	1.18%	-30.57%	2.44%
Corp Bond-Gen	228	6.22%	166.45%	.67%	-3.76%	2.34%
Cp Bond-HiQu	120	6.22%	155.50%	.63%	1.20%	2.17%
Cp Bond-HiYl	64	.01%	119.15%	.83%	-65.48%	3.74%
Emg Mkt	53	-6.01%	106.07%	1.65%	-86.55%	.34%
Eq Income	74	-2.39%	70.50%	1.00%	-23.05%	1.66%
Eur. Stk.	24	-5.71%	95.33%	1.42%	-67.12%	1.50%
For. Stk.	230	-5.53%	82.53%	1.22%	-65.23%	1.24%
G.Bd.-ARM	10	5.13%	74.40%	.63%	-8.30%	1.96%
G.Bd.-Gen	107	6.53%	193.69%	.71%	2.72%	2.06%
G.Bd.-Mort	49	6.62%	219.18%	.67%	-1.20%	2.26%
G.Bd.-Treas	35	6.60%	94.26%	.64%	4.46%	1.97%
Growth	651	-3.05%	107.40%	1.06%	-52.25%	1.48%
Gr. & Inc.	287	-3.67%	81.63%	.81%	-30.08%	1.32%
Mul.As.Global	18	.60%	121.56%	1.22%	-48.33%	1.90%
Mul.Sec.Bd.	23	4.49%	211.78%	.90%	-14.30%	2.64%
MuniBdCa	38	5.22%	37.02%	.58%	6.94%	.05%
MuniBdNat	153	4.90%	55.46%	.66%	.61%	.06%
MuniBdNY	24	5.36%	46.33%	.71%	5.79%	.11%
MuniBdSingSt	159	5.20%	23.91%	.64%	5.23%	.02%
Pacif.Stk	50	-1.92%	105.16%	1.75%	-95.16%	.86%
Sm.Company	312	-1.29%	96.06%	1.18%	-45.52%	1.46%
Spec.Comm	10	-9.19%	335.30%	1.56%	-253.70%	1.77%
Spec.Finn.	14	.19%	258.93%	1.33%	-46.35%	1.33%
Spec.Hlth	14	5.82%	129.36%	1.28%	-50.36%	1.06%
Spec.Nat.Res.	20	.72%	184.35%	1.33%	-25.35%	.65%
Spec.Prec.Met.	12	2.20%	165.00%	1.82%	-63.33%	.28%
Spec.Re.Est.	44	3.47%	64.91%	1.13%	-.81%	2.00%
Spec.Tech.	29	-5.29%	175.07%	1.48%	-323.86%	1.21%
Spec.Unal.	9	-2.74%	574.33%	1.50%	-26.00%	.72%
Spec.Util.	17	-3.64%	52.82%	.89%	-68.82%	2.04%
Wrld.Bd.	61	5.87%	20.965%	.87%	-2.39%	2.44%
Wrld.Stk.	49	-4.54%	119.59%	1.23%	-68.44%	1.52%

where $Turn_i$ is the portfolio turnover for mutual fund i , $Return_i$ is the past 5-year average return for mutual fund i ; The variable $Assets_i$ is the net assets under management for mutual fund i . Assets are used as a control variable because of the potential economies of scale in mutual fund management. The slope coefficient of assets is expected to have a significant negative sign for this test. The null hypothesis will be rejected if the slope coefficient of the variable $return_i$ is significant. ϵ_i is the error term of the equation for mutual fund i .

Similar regression models were used to test H2 through H4. For H2, the dependent

Table 2

Mutual fund characteristics by asset size decile for equity (A) and fixed income (B) funds

A: Equity mutual funds							
Asset Size Decile	Assets (millions of dollars)	Return (%)	Turnover	Expense Ratio	PCGE	Tax Cost Ratio	Percent of Total assets
1	1.95	-4.51	141.66	1.32	-91.91	1.42	.03
2	9.78	-3.34	132.96	1.34	-60.83	1.33	.17
3	21.41	-3.23	96.71	1.25	-62.07	1.53	.38
4	39.97	-3.45	115.69	1.20	-69.33	1.44	.72
5	66.04	-2.78	93.42	1.11	-51.58	1.48	1.17
6	110.64	-2.21	95.36	1.10	-42.01	1.43	1.98
7	185.89	-2.23	97.10	1.07	-41.61	1.55	3.30
8	324.01	-2.00	81.65	1.02	-43.01	1.46	5.77
9	672.08	-1.79	80.63	.92	-28.46	1.36	11.97
10	4202.6	-1.10	53.17	.77	-28.65	1.35	74.50

B: Fixed income mutual funds							
Asset Size Decile	Assets (millions of dollars)	Return (%)	Turnover	Expense Ratio	PCGE	Tax Cost Ratio	Percent of Total Assets
1	4.87	3.73	121.93	.83	-21.10	1.86	.09
2	21.57	4.99	132.62	.80	-9.56	1.64	.39
3	44.35	4.89	108.04	.79	-5.62	1.59	.82
4	74.93	5.19	116.64	.71	-2.91	1.49	1.38
5	121.28	4.90	121.54	.71	-4.81	1.48	2.24
6	175.64	5.17	112.32	.69	-1.14	1.51	3.24
7	262.25	4.79	108.90	.64	-7.19	1.59	4.84
8	425.59	5.57	147.61	.64	-1.42	1.67	7.86
9	730.83	5.52	128.86	.62	-.58	1.60	13.51
10	3548.44	5.96	122.14	.49	2.18	1.63	65.59

"Assets" is the average net assets in funds in this size decile.

"Return" is the mean annual return for assets in this size decile for the five year period ended 3/31/2003.

"Turnover" is the mean of the lesser of dollar volume of shares purchased or sold divided by average net asset value in the time period.

"Expense ratio" is mean operating expenses and management fees divided by assets for the funds in the size quintile.

"PCGE" is the mean potential capital gains exposure for the funds in the size quintile.

"Tax cost ratio" is the mean of the reduction in return due to taxes if all gains were realized.

"Percent of total assets" is the percent of the total assets of all funds in the sample in the asset size decile.

variable is the expense ratio. For H3 dependent variable is the PCGE. For H4 the dependent variable is the tax cost ratio. In all cases, the null hypothesis will be rejected if the slope coefficient of $Return_i$ is significant.

To test H5 and H6, regression analysis is again used. To test H5, the log of the total assets under management is added to the equation. To test H6, the total number of funds under management by the fund manager replaces the total assets under management. All of the tests are conducted separately for equity and fixed income funds.

Table 3

Size decile characteristics of mutual fund families (number of mutual fund families in study 408)

Asset Size Decile	Total Net Assets Managed (Millions of Dollars)	Unweighted Average Return	Unweighted Average Turnover	Unweighted Average Expense Ratio	PCGE	Tax Cost Ratio	Number of Funds Managed	% of Total Assets	% of Total Mutual Funds Managed
1	7.51	4.28	103.68	1.93	3.85	1.34	1.45	.02	1.81
2	26.91	3.99	85.61	1.52	2.08	1.04	1.36	.06	1.74
3	66.50	3.75	108.22	1.32	5.24	1.22	2.07	.16	2.64
4	141.03	4.43	95.33	1.09	2.68	1.53	2.75	.33	3.51
5	231.39	5.90	98.34	1.22	2.38	1.51	3.51	.55	4.48
6	449.42	5.16	104.58	1.11	3.56	1.35	4.24	1.07	5.41
7	872.12	4.52	101.83	1.09	2.71	1.55	5.76	2.07	7.34
8	1733.54	4.85	121.16	.94	1.71	1.45	11.26	4.12	14.37
9	3820.47	4.53	94.97	.99	4.04	1.59	12.59	9.09	16.06
10	35510.65	5.01	98.21	.84	2.53	1.52	34.22	82.50	42.62

“Assets” is the average net assets in funds in this size decile.

“Return” is the mean annual return for assets in this size decile for the five year period ended 3/31/2003.

“Turnover” is the mean of the lesser of dollar volume of shares purchased or sold divided by average net asset value in the time period.

“Expense ratio” is mean operating expenses and management fees divided by assets for the funds in the size quintile.

“PCGE” is the mean potential capital gains exposure for the funds in the size quintile.

“Tax cost ratio” is the mean of the reduction in return due to taxes if all gains were realized.

“Percent of total assets” is the percent of the total assets of all funds in the sample in the asset size decile for the mutual fund families.

“Percent of total mutual funds managed” is the percent of the total mutual funds managed by families in the size decile.

5. Results

The tests of H1 through H4 appear on Table 4 in panel A for equity funds and in panel B for Fixed income funds.

The null hypothesis that there is no relation between returns and asset turnover (H1) is rejected for both equity and fixed income funds. However, for equity funds there is a negative relation between turnover and return as was expected. More frequent trading for equity funds is associated with lower returns even after controlling for the net assets under management.

For fixed income funds, there is a significant positive relation between trading and return. Net assets under management do not affect trading for fixed income funds. One explanation for this positive relationship is that the management of bond funds may depend on controlling duration which requires trading but which has a relatively predictable effect on returns as opposed to the uncertainty associated with trading in equities.

The null hypothesis that there is no relation between expense ratio and return (H2) is not rejected for equity funds. There does not appear to be a relation between the expense ratio and return for equity funds.

For fixed income funds, there is a significant negative relation between expense ratio and

Table 4
Tests of hypotheses 1–4 using regression analysis

A: Tests of H1–H4 for Equity Mutual Funds						
Hypothesis	Dependent Variable	F Value	Adjusted R-Square	Intercept	Return	Log of Assets
H1	Turnover (T-Value)	24.48**	.02	134.47*** (16.64)	−1.74*** (−2.67)	−.93 (−5.87)
H2	Expense Ratio (T-Value)	107.40***	.09	1.44*** (50.95)	−2.75 × 10 ^{−03} (−1.20)	−.08*** (−14.14)
H3	PCGE (T-Value)	171.93***	.14	−55.66*** (−10.80)	6.96*** (16.69)	4.93*** (4.91)
H4	Tax Cost Ratio (T-Value)	83.86***	.07	1.67*** (31.67)	.06*** (12.95)	−.02** (−2.16)
B: Tests of H1–H4 for Fixed Income Mutual Funds						
Hypothesis	Dependent Variable	F Value	Adjusted R-Square	Intercept	Return	Log of Assets
H1	Turnover (T-Value)	10.46***	.02	82.12*** (5.36)	8.83*** (4.53)	−.98 (−.36)
H2	Expense Ratio (T-Value)	140.86***	.22	1.04*** (46.69)	−.03*** (−10.44)	−.04*** (−10.59)
H3	PCGE (T-Value)	231.73***	.32	−45.32*** (−16.88)	6.99*** (20.48)	.98** (2.08)
H4	Tax Cost Ratio (T-Value)	4.40**	.01	1.81*** (15.50)	−.04*** (−2.91)	.00 (.00)

* Significant at .10 level

** Significant at .5 level

*** Significant at .01 level

H1 - Trading activity is unrelated to market performance.

H2 - There is no relationship between performance and expense ratio.

H3 - Poorly performing funds will have the same PCGE as funds with good performance.

H4 - There is no relation between tax costs and returns.

return. The inconsistency in the results between equity and fixed income funds may again be due to the fact that returns on fixed income securities are more controllable than returns on equity securities. If that is true, then management efficiency in controlling costs becomes a relatively more important matter for the fixed income funds.

There is a positive and significant relation between PCGE and return (H3) for both equity and fixed income funds. This is consistent with the idea that PCGE provides a measure of the past success of the fund management.

For equity funds, there is a positive and significant relation between tax cost and return (H4). Fund management cannot produce returns without creating tax consequences for the shareholders of the fund. For fixed income funds, there is a significant negative relation between tax costs and returns. The result is probably influenced by the large number of municipal bond funds that invest in securities for which investors pay no tax on the interest income that is generated.

There remain two questions that are addressed by this article: whether there are economies

Table 5

Test of hypothesis H5: economies of scale extend to the fund family level of organization

Type of Fund	Dependent Variable	F Value	Adjusted R-Squared	Intercept	Fund Return	Fund Assets	Family Assets
Equity	Expense Ratio (T-Value)	133.48***	.16	1.84*** (44.70)	-3.88×10^{-3} * (-1.76)	-.04** (-7.52)	-.07*** (-12.98)
Fixed Income	Expense Ratio (T-Value)	102.84***	.24	1.16*** (34.27)	-.03*** (-10.64)	-.03*** (-6.85)	-.02*** (-4.59)

* Significant at 0.10

** Significant at 0.05

*** Significant at 0.01

of scale and scope in mutual fund families. Economies of scale are addressed in Table 5. Controlling for fund return and fund assets, there is a negative and significant relation between expense ratio and the total assets under management by a particular fund family. The null hypothesis of no relation is rejected. The result is consistent with the possibility that there are economies of scale in the mutual fund industry at the asset manager level as well as at the individual fund level. For fixed income funds, a negative and significant relation between expense ratio and the assets in a fund family is also present.

Economies of scope are addressed in Table 6. For both equity and fixed income funds, the null hypotheses (H6) is rejected. The result is consistent with the idea that mutual fund managers and investors benefit from economies of scope. Costs decrease as the variety of types of funds increases.

6. Conclusions

We studied some aspects of mutual fund behavior. We found that over time, the managers of larger funds and larger fund families produce greater returns at lower cost. Much of the difference in performance is related to differences in portfolio objective and may be due to the time period studied. The mutual fund industry is a concentrated industry with nearly three fourths of the equity assets and more than 65% of the fixed income assets held by the largest size decile. These larger funds had the lowest tax cost ratio. For the individual investor, the conclusion that larger funds that are members of large fund families are more likely to produce superior returns at lower cost is clear.

Table 6

Test of hypothesis H6: economies of scope extend to the fund family

Type of Fund	Dependent Variable	F Value	Adjusted R-Square	Intercept	Fund Return	Fund Assets	Funds Managed By Family
Equity	Expense Ratio (T-Value)	98.83***	.12	1.50*** (52.42)	3.68×10^{-3} (-1.63)	-.07*** (-12.70)	-3.28×10^{-3} *** (-8.62)
Fixed Income	Expense Ratio (T-Value)	102.26***	.23	1.06*** (47.23)	-.03*** (-10.63)	-.04*** (-8.91)	-1.19×10^{-3} *** (-4.44)

Equity managers who trade less tended to produce greater returns while fixed income managers who traded more tended to produce greater returns. This may be due to the greater predictability of fixed income returns and the reliance of fixed income fund managers on models emphasizing the control of such factors as duration and convexity.

Both equity and fixed income funds managers who produce better returns manage their funds at lower cost. On average, costs are less than 1% of assets. The greatest costs are associated with aggressive growth stock funds. The lowest with high quality corporate bond funds and government related adjustable rate mortgage bonds.

Funds that experienced strong returns in the past will have significantly greater Potential Capital Gain Exposure than other funds since they will a greater number of appreciated assets. On average, PCGE is negative across all fund classes. In some cases the unrecognized capital loss is quite substantial. The SEC requires that PCGE be reported in order to alert shareholders to potential future tax liabilities. Instead investors may consider high PCGE as the hallmark of funds that performed well in the past.

We confirm the Latzko (1999) finding that mutual fund cost ratios are consistent with the existence of economies of scale. Building on Latzko as well as Malhotra and McLeod, we show that the economies of scale exist at both the fund level and the fund family level. We find the cost structure in the mutual fund industry to be consistent with the existence of economies of scope, in that cost ratios for individual funds decrease as the number of different types of funds controlled by the asset manager increase.

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