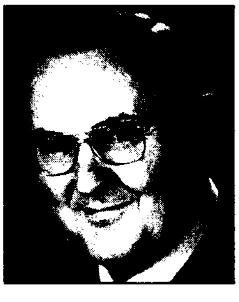
Pricing of Mutual Fund Services in Retirement Plans: Evidence from Open-End Equity Funds

PERFORMANCE COUNTS, BUT SO DOES MARKET POWER

By Jacob De Rooy



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Management fees of mutual funds are more costly to investors than is often realized. Moreover, research indicates that in many cases, the fees are not related to performance, contrary to what might be expected from an efficient market. This study uses sample data to illustrate the consequences of inefficiency to an individual investor. It then turns to an empirical examination of the determinants of the ratio of management fees to total assets (MER), investigating market concentration, fund performance, and non-performance characteristics as explanatory variables. All of these classes of variables contributed to the variation of MERs .

Retirement plans are significant components of workers' compensation packages and are important labor costs for employers. Most employers place employees' retirement monies in independent mutual funds during workers' job tenure. The investment companies that operate these funds charge annual management fees that are a percentage of the funds managed. The aggregate of these fees is the fund's management expense (ME). Because these firms are entrusted with individuals' wealth, there are government regulations that require transparency in mutual fund management fees (Saunders

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and Cornett, 2006, pp. 132-136).

In *defined benefit plans* the size of the ME is positively correlated with the employer's cost of providing these plans (Pozen, 2002, pp.351-353) because the employer pays these costs. Beginning in the 1970s, most private sector employers sought to reduce their liability for retirement plans by offering *defined contribution plans*, usually 401(k) or 403(b) plans. Since then, the funds held in defined contribution plans have significantly exceeded those in defined benefit plans (Saunders and Cornett, 2006, p. 518; Wise, 2006). While the management expenses of defined benefit plans are paid by the employer, management expenses of funds in defined contribution plans are absorbed by employees and reduce their net returns over their job tenure. Generally, the employee has no voice in selecting the investment companies in their retirement plan: the employer's selection of an investment company determines the mutual funds available to employees, and the MEs they must pay.

Given full information about MEs, the employer's benefits manager is presumed to select the investment company that minimizes the firm's cost of its retirement plan or that maximizes employees' benefits. As in the choice of other productive assets used by the firm, cost minimization is realized by comparing costs and value—see, for example, Baye (2000), pp. 165-175. However, recent research suggests an enigma in the mutual fund market: full information about fees seems to be disconnected from economic realities in decision-making. This disconnect penalizes many employers and employees who use mutual funds for retirement programs.

Despite government mandated full information, some benefits managers and investors may be "overpaying" for mutual fund services.

The next section illustrates the consequences of high ratios of MEs relative to total assets—management expense ratios (MERs)—in reducing workers' retirement benefits and lifetime compensation. The balance of the paper analyses the size of the MER, which is the "price" the employer (in defined benefits plans) or employee (in defined contribution plans) pays for managing retirement funds. It shows that, despite government-mandated full information, some benefits managers and investors may be "overpaying" for mutual fund services. This increases employers' costs of providing retirement benefits and reduces employees' life-time income.

Full information and free competition implies that mutual funds with identical portfolios and services should have MERs that give investors identical returns net of fees. Empirical evidence does not support this. Hortaçsu and Syverson (2004) report a study of the MERs of a large sample of Standard & Poors 500 common stock market index mutual funds. Index funds are managed so as to give investors returns that are highly correlated with returns on a market index. Therefore, the universe of mutual funds that attempt to mimic the same market index should have MERs that provide identical net returns. They found that MERs varied widely among index funds based on the S&P 500 so that net returns were not identical. MERs made the difference in net returns. Because all of these funds were designed to provide identical returns, the results of this study were transparent. Other economists have reported variations in mutual fund fees that cannot be fully explained by factors such as fund performance or asset type, e.g., Luo (2002) and Dellva and Olson (1998). This paper broadens research on mutual fund MERs by including funds with different investment objectives.

MERS and Retirement Fund Performance

Investors can place their retirement monies in mutual funds with a variety of investment objectives and investment styles. For this discussion, I will use growth equity funds, the largest category of mutual funds, which are popular for use in retirement plans. Growth funds use active management to select stocks that are expected to increase in value at an above-average rate. We use a non-random sample of 2,651 growth funds in the Value Line Mutual Funds database. The distribution of MERs of this sample is shown in Figure 1.

As in all categories of mutual funds, there is considerable variation in MERs. The MER distribution for growth equity funds is approximately bimodal. The first modal value is an annual MER of 1.25 percent: 458 funds of 2,651 had this charge. The next, lower mode is at 2.25 percent, with 369 funds. We applied these values to a hypothetical employee. This person started employment at a salary of $42,000 per year and received yearly increments of three percent. To fund retirement benefits, the worker's employer deposited an amount equal to ten percent of annual earnings in a retirement account where funds were invested in a growth stock mutual fund that appreciated ten percent per year.[1] To determine the impact of the MER on this person's retirement accumulation, see Table 1.

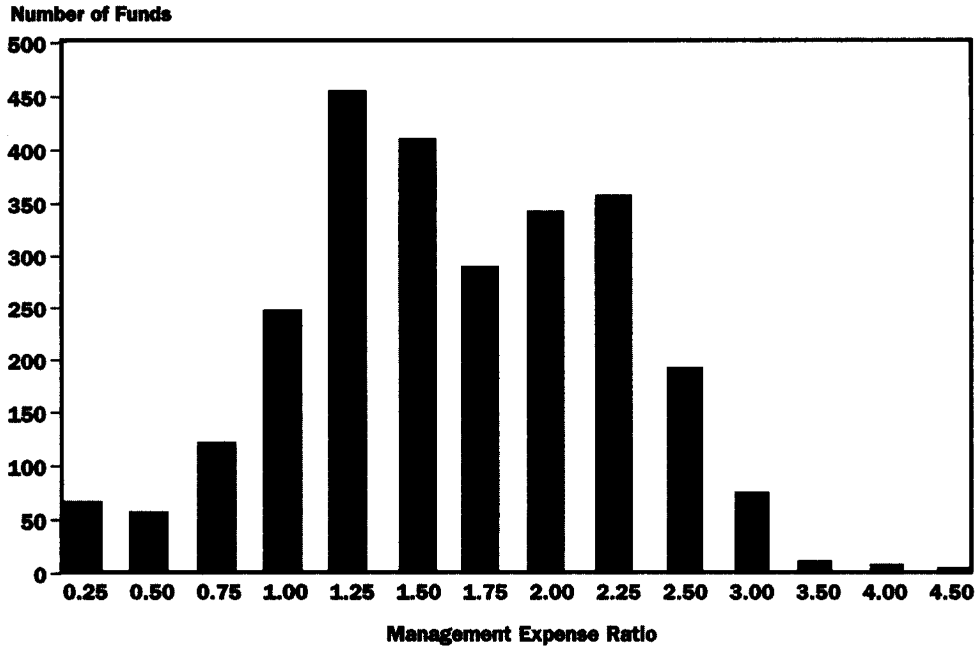
Assume the growth fund charged an MER of 2.25 percent. At the end of 30 years of employment the retirement fund accumulation would be $615,371. At retirement, this accumulation could be used to purchase a 30 year annuity of $49,591 per year. See the third column of Table 1. (Alternatively, a lifetime annuity of $43,706 could be purchased.)

If the employer selected an investment company with MER = 1.25 percent, the retiree would have a 30 year annual annuity payout of $52,838. Because the MER in this case would be 100 basis points lower, the retirement plan accumulation and annuity income would be 18 percent higher. This shows the benefits to the employer and employee of holding the MER down.

With 30 years of job tenure, however, the worker would have advanced to an earned salary of $98,978[2] so that the available annuity may not be sufficient for her/his needs. As a result, let us assume that the employee decided to postpone retirement until after year 40. Expected salary would be $133,015 in the 40th year of work. If the retirement plan had an MER of 2.25 percent, annuity income would be 21 percent lower than this expected earned income. But if the retirement plan had an MER of 1.25 percent, annuity income would cover expected earned income (the annual annuity payouts would be $139,115)[3] and would be 27 percent higher than the annuity for the retirement plan where MER = 2.25. The relative differential retirement income becomes larger as the job tenure lengthens. Regardless of when a worker retires, an employer whose retirement plan has mutual funds with a lower MER substantially increases its

FIGURE 1

MANAGEMENT EXPENSE RATIOS OF GROWTH STOCK FUNDS



Source: Value Line, Value Line Mutual Fund Survey. *www.valueline.com*

TABLE 1

RETIREMENT FUND ACCUMULATION

Scenario: Initial Salary of $42,000 per year with annual increments of three percent, ten percent of annual salary contributed to retirement fund, fund grows ten percent per year less MER of the mutual fund in the retirement plan

	MER = 1.25%	MER = 2.25%	$X_{1.25}/X_{2.25}$
Fund at end of 30 year job tenure	$727,310	$615,371	118%
30 year annuity payout at retirement	$52,838	$49,591	
Fund at end of 40 year job tenure	$1,854,647	$1,462,409	127%
30 year annuity payout at retirement	$134,738	$106,242	

[1]This annual payout is guaranteed. If the retiree dies before 30 years, the remaining payouts are made to the retiree's survivor. But payments stop after 30 years, whether or not the retiree survives. The alternative perpetual annuity can be passed onto survivors and will continue payouts indefinitely. In these illustrations we assume that the retiree maximizes current income.

[2]This results from increasing the initial salary of $42,000 per year by three percent, compounded over the pre-retirement years of employment.

[3]After 40 years of work the employee's retirement savings would be $1,854,647, which would purchase a 30-year annual payout of $139,115 at a seven percent discount rate. We ignore income taxes in this illustration.

We suggest that market power is the most important reason that many mutual funds can set high management fees.

employees' annuity benefits and lifetime incomes without additional cost to the firm.

Determinants of MERs

Are benefits managers and other users of mutual funds misusing the information they have? Are investment companies who provide mutual funds mispricing their services? Is the mutual fund marketplace inefficient? If the answers to any of these questions are affirmative, then employers may be overpaying for their employees' retirement benefits and/or covered workers may be getting less lifetime income than they can. We saw in the previous section that this has serious implications for retirement programs. Before we can conclude that mutual fund services are mispriced, we need to determine what factors are systematically related to MERs.

Our approach is to estimate a simple model of MERs using variables that are suggested by earlier researchers plus two suggested by our own work. One advantage of our model is that we include a variety of variables that measure a mutual fund's market power. Another advantage is that we cover funds with several investment objectives.

Market power is the ability of a firm to set its price above its marginal cost. (Baye, 2000, pp.480-488). We suggest that market power is the most important reason that many mutual funds can set high management fees that are levied on investors. If a variable that represents tangible benefits to an employer or employee, such as annual rate of return, is positively related to MER, we consider that the mutual fund is fairly priced. But if a measure of market power is positively related to MER, then the fund may be mispriced because there may be no consumer benefit associated with the price premium: producer surplus increases as consumer surplus shrinks (Baye, 2000, pp.41-43). Market power often is associated with market concentration: the fewer the mutual funds in the market the more market power each incumbent fund possesses. However, even if there are many market participants, if one competitor has a distinct advantage (such as consistently high investment returns with low risk) it possesses market power. In our model we include market concentration and fund performance.

Market Concentration and Structure

Investment companies sell mutual fund services in a market with varying degrees of competition. Economists recognize that the pricing power of such firms is largely determined by market structure. Market structure is a function of the number of competitors, their size, technologies, operating costs, product substitution, and ease of entry and exit in the market (Baye, 2000, pp. 237-267). In a perfectly competitive market, firms tend to price products at or near marginal cost. As competition lessens, the excess of management fees over marginal cost increases.

After studying fee-setting in a large number of mutual funds, Luo (2002) provided evidence that market structure is responsible for a large share of the fund's markup (the observed differences between management expenses and marginal cost). Luo developed a demand model for the jth mutual fund in the k category of funds,

$$(2)\ F_j = f(A_{jk}, \mu_j, \sigma_j, Y_j),$$

where A is the size of the fund in dollar value of assets managed, μ_j is the average annual rate of annual return delivered to investors, σ_j is the standard deviation of annual returns, and Y represents the age of the fund in years. This equation shows demand as a function of fund performance and cost variables. There is substantial evidence of scale economies in fund management (e.g., Berkowitz and Kotowitz, 2002 and Malhotra and Mclead, 1997), which calls for the variable A. Age (Y) is also important because over time funds become more widely known to investors and the shareholder base expands; in addition, the fund operators benefit from a learning curve in fund management. Luo used the demand equation to derive the inverse demand curve from which the marginal cost (MC) was found.

Luo measured market concentration (competitiveness) using the familiar Herfindahl-Hirshman Index, HHI (Baye, 2000, pp.240-242).

$$(3)\ HHI_k = 10{,}000\ \Sigma_{j\text{-}k}\ (w_{jk}/W_k)^2,$$

where wjk is the asset value of the jth mutual fund in the kth category[4] of funds, and W_k is the total dollar assets held by all funds in that category.[5] Luo found that mark-ups were significantly related to market concentration, i.e., mark-ups over MCs were relatively high for categories where HHI was high.

[4]The fund categories are the fund objectives such as growth, income, energy, foreign equity. See Table 2.
[5]If HHI=10,000 there is only one fund in the category so that that fund holds a monopoly. Categories with HHIs of 0 to the low 3 digits are competitive.

The main contribution of Luo's work was to show the significance of market concentration and competitiveness. ME is equal to the fund's MC plus the investment company managers' mark-up. MC is based on cost-related factors such as the fund's age, size (assets), fund performance, and portfolio characteristics. The later include the fund's liquidity (percentage of the funds in cash assets) and portfolio turnover. The remainder of the ME is mark-up, which is negatively related to competitiveness of the market structure.

An important element of competitiveness that is not captured in the HHI, as defined in (3), is the fact that the investment companies that create, operate, and manage mutual funds are distributing "families" of substitutable funds. Large families have distinct marketing advantages in that they offer a menu of investment choices and make it easy for investors to switch from one fund to another at little or no cost. Large families have market power that they might exploit by setting high MEs, resulting in high MERs. This element of competition was not considered in earlier studies of the mutual fund marketplace. We expect that the size and diversity of a mutual fund's family gives that fund more market power in pricing its services.

Market structure was measured by Luo using HHI over all mutual funds in a segment of the mutual fund marketplace. Each segment consists of all funds that have a common investment objective (see Table 2). HHI is based on each fund's market share. It does not explicitly show the effect of the number of mutual funds and the variance of the outputs of these funds. Hannan (1997) and Rhoades (1995) show that this additional information may be revealing.

Following Hannan, HHI can be expressed as,

$$(4)\ HHI_k = (V/N)_k + (1/N)_k,$$

where V is the coefficient of variation of the asset sizes of the mutual funds in the segment, and N is the number of funds in the segment. Either (3) or (4) could be used as a determinant of MER. For example,

$$(5)\ MER_k = \theta_0 + \theta_1 HHI_k + \theta_2 X_k,$$

where X_k is a vector of other determinants of the MER. In the empirical work below, (3) and (4) will both be used in alternative specifications.

The sign and significance of measures of market concentration will be major indicators of the market power of investment companies. If a mutual fund category is highly concentrated, funds in that category are likely to have market power and use this power to charge high management fees.

Fund Performance

An employer's benefits manager and its vested employees should be willing to pay higher MERs to an investment company that provides superior performance than do funds of other investment companies. In discussing Table 1, we assumed that both the high- and low-fee plans being analyzed, with MERs of 1.25 percent and 2.25 percent, produced the same gross investment return of ten percent. But if our high-fee plan with MER of 2.25 percent offered a gross return of 12 percent, the 30 year annuity at year 40 would pay the retiree $190,843, in place of $106,242 that was afforded by a ten percent gross return. That healthy net return would certainly justify the higher 2.25 percent management fee. Do mutual funds with higher MERs generally provide richer returns that justify their charges? To answer this question we need to find a measurement of investment returns. It would not be enough to simply use one year's return.

Modern portfolio theory uses various measures of return and risk, and their relationship, to evaluate a mutual fund portfolio's performance. One popular measure of a portfolio's behavior is the portfolio's beta value (β). The beta is a number that shows how the value of a fund changes relative to the value of the stock market (Kidwell, 2003, pp. 279-283). It represents systemic risk. Financial analysts use beta to measure the "riskiness" of a mutual fund relative to changes in the general market.

$$(6)\ E(R_j) = (R_f) + \beta_j \{E(R_m) - R_f\},$$

where $E(R_j)$ is the expected annual rate of return from the jth mutual fund, R_f is the current risk-free rate of return, and R_m is the average rate of return of all mutual funds in the market. β_j is a regression coefficient showing how the jth fund's return changes in response to changes in the average market risk premium. Low values of β may be desirable in assembling a conservative portfolio, given the level of $E(R_j)$. Therefore, benefits managers and investors may be willing to pay a higher management expense fee to buy into a fund with a low value of β.

A common and intuitive measure of riskiness is the standard deviation of annual rates of return of a portfolio over time.

$$(7)\ \sigma_j = \Sigma_{jt}\{R_{jt} - E(R_j)\}^2\, p_{jt},$$

where p_j represents the probability distribution of annual returns R_j. Investors are generally adverse to risk so that funds with high values of σ are less attractive and should have lower MERs, i.e., $\partial MER/\sigma < 0$. Standard deviation is an absolute measure of variation, whereas beta is a relative measure.

Another popular measure is the coefficient of determination (r^2) of a relationship over time between the net asset value of a mutual fund and a general broad market index. It is a crude indicator of how closely a fund follows broad market trends. The value of r^2 is determined from a simple linear regression of R_{jt} on R_{mt} over time:

$$(8)\ R_{jt} = a_0 + a_1 R_{mt},$$

The value r^2 is the square of the correlation between R_{jt} and R_{mt} and shows how closely the returns of a fund follow those of the general market.

One widely used and simple indicator that marries risk and return is the Sharpe index (Kritzman, 2003, pp.37-39). This indicator is the ratio of returns, in excess of the risk-free return, to the standard deviation of the fund:

$$(9)\ S = (R_j - R_m) / \sigma_j$$

Higher values of S are favorable so that we expect $\partial MER / \partial S > 0$ in an efficient market in which decision-makers utilize full information.

In general, superior investment performance of a mutual fund increases the demand for that fund and permits fund operators to charge high management fees, thereby taking back some of the consumer surplus the fund could otherwise provide investors.

Fund Characteristics

Chordia (1997), LaPlante (2001), and Malhotra and McLead (1997) all found factors that demonstrated the effect of mutual fund operating costs on MERs. One of these is the liquidity of a fund as shown by the fund's cash ratio (C/A): cash assets as a ratio of all portfolio assets. Cash assets earn nominal returns so that they hold down average rate of return μ_j. But cash is held to redeem shares, just as commercial banks hold cash to finance deposit withdrawals. Unlike banks, mutual funds have no central bank or lender of last resort to provide liquidity. Therefore, the ratio of cash to assets, C/A, must be adequate to meet even potentially extreme redemption demands. If investors have high liquidity preference, then a high level of C/A drags down portfolio return. The need for high levels of cash is an expense (opportunity cost) and often leads to a relatively high MER.

Mutual funds may charge front-end loads and back-end loads (Pozen, 2002, pp. 435-439). Chordia (1997) and others show that these loads may be largely intended to make fund switching by investors more costly. If switching is discouraged, the liquidity requirements of fund managers are reduced because the volume of cash inflows and outflows, which are shocks to the portfolio, are smaller.

Narayanan and Warther (2000) argue that funds use loads to discourage investors with high liquidity demands. Investors who tolerate high loads are usually unsophisticated. Sophisticated investors try to avoid loads, and have low liquidity needs so as to earn relatively higher returns. Narayanan and Warther further assert that unsophisticated investors make high service demand on fund distributors (e.g., brokers) and may have lower reservation returns.

Portfolio turnover is related to MER. The more frequently fund managers trade their investment assets, the more they incur brokerage commissions and other transaction costs. One would expect high turnover to be positively correlated with MER. But opinion on this issue is divided. Some students contend that funds with high turnover rates are relatively more flexible in responding to market conditions and in responding to investment opportunities.

Some mutual funds design their portfolios to minimize short-term gains, which are taxable at higher income tax rates. They attempt to keep their shareholders' tax liabilities low. Shareholders may favor such mutual funds and be willing to pay higher MERs.

Institutional funds have large minimum investment requirements that range from $100,000 to several million dollars. These funds probably enjoy low rates of withdrawals and inflows of funds. The result is that their administrative costs and liquidity requirements are low, and so are their MERs.

At any given time, many mutual funds are closed to new investors. Often, funds are closed when they pass optimal asset size, which usually means that managers have reached diminishing returns in locating additional investments in desired investment classes. However, occasionally closed funds are re-opened when market conditions change.

In our empirical analysis of MERs we specify MER as a function of all of the measurements of market concentration, fund performance, and cost-related fund characteristics and will include those measurements that are statistically significant.

A Database for Analysis of MERs of Open-End Equity Funds

To estimate the determinants of MER we assembled a customized database of nearly 5,000 equity stock funds from the master Value Line database of all mutual funds. The master Value Line universe consists of about 14,000 funds. We selected funds with these properties: The funds invest only in equities. Equity assets are closer substitutes than are stocks and bonds. They also share similar performance measures. This reduced the data base to about 7,500 mutual funds.

The funds have survived for at least five years. Individual investor returns are affected by holding periods, largely because of loads. By measuring performance for a five-year holding period we avoid the effect of loads on performance, in most cases. Most loads, such as end-loads that are charged when shares are sold, are completely phased out over a five-year holding period. The impact of front-end loads, which are fees for purchasing shares, diminishes over time. Over five years an initial three percent front-end sales charge averages only 0.6 percent per year.

Observations must be available for all of the variables used in our MER models. We deleted funds that did not survive for five years or that were less than five years old. We also deleted funds for which the Value Line database did not report observations on all variables in our model. Each fund had a clearly defined investment objective so that the fund's category was identified unambiguously. The resulting customized data base consisted of just under 4,900 mutual funds. The distribution of funds in this data base is shown in Table 2.

This table shows population statistics from the Value Line mutual funds, and reports our customized database size in brackets. The sample size in each category is large enough to have a high likelihood of giving reliable estimates of population parameters. Column 2 shows the universe size in each category and the sample size in brackets. Column 3 reports the mean MER in each category and the mean sample MER in brackets. The sample means, were not significantly different from the category means, using a classical t-test of sample means. For example, for all funds (last row) we cannot reject the null hypothesis that the sample mean MER of 1.57 comes from a population with mean MER of 1.40; the probability that the null hypothesis is false is only 0.01.

TABLE 2

COMPARISON OF VALUE LINE UNIVERSE AND THE SAMPLE [IN BRACKETS] OF EQUITY FUNDS

Fund Category	Number Of Funds	Mean MER	Coefficients of Variation of MERs
GENERAL EQUITY			
Aggressive Growth	363 [236]	1.79 [1.62]	1.24 [0.35]
Growth	2,660 [1,760]	1.53 [1.48]	0.42 [0.40]
Growth/Income	887 [643]	1.32 [1.25]	0.47 [0.47]
Income	261 [116]	1.57 [1.47]	0.42 [0.43]
Small Company	1,034 [708]	1.68 [1.58]	0.85 [0.37]
INTERNATIONAL EQUITY			
European			
Equity	92 [64]	2.06 [1.98]	0.36 [0.34]
Foreigh Equity	879 [620]	1.88 [1.84]	0.38 [0.39]
Global Equity	385 [214]	1.84 [1.80]	0.35 [0.36]
Pacific Equity	120 [99]	2.13 [2.11]	0.33 [0.35]
SPECIALTY EQUITY			
Energy	68 [49]	1.65 [1.56]	0.42 [0.31]
Fiancial Services	116 [77]	1.75 [1.68]	0.32 [0.34]
Health	157 [63]	2.06 [1.87]	0.35 [0.29]
Precious Metals	50 [36]	1.78 [1.66]	0.31 [0.33]
Technology	289 [128]	2.02 [1.86]	0.34 [0.36]
Utilites	96 [72]	1.67 [1.57]	0.31 [0.32]
ALL OPEN-END EQUITY MUTUAL FUNDS			
All Funds	7,446 [4,885]	1.40 [1.57]	0.64 [0.41]

Note: For a sampling error of 0.03, the liklihood is 0.01 or less that the sample means [in brackets] is significantly different from the universe means.

Column 4 reports the coefficients of variation (standard deviation divided by the mean). These coefficients (CVs), which measure variation, are uniformly small. The sample CVs. are larger than the population CVs., which is to be expected. In most mutual fund categories, the MERs are about 1.5 to 2.0 percent per year. The MERs are highest on international equity and specialty equity funds. These funds may be more difficult to manage due to foreign exchange risk and the size and difficulty of collecting information on high-technology firms.

The sample consists of observations from 15 mutual fund categories. A major objective of this paper is to determine the extent to which competitiveness within each category influences MER beyond non-market variables such as fund performance and cost of operation. Therefore, prior to modeling MER we found the HHI for each category based on equation (3). These are shown in the Appendix. The most competitive categories are the ones with the largest number of competitors in the category. Notable competitive categories are Growth, Growth/Income, Small Company, and Technology. The least competitive funds, which probably have the largest market power, are in the European Equity, Energy, and Health categories. Using the CV of asset size as a measuring stick, Specialty funds are fairly uniform in size and are generally small. It is worth noting that the 15 categories have a variety of market structures. (See the Appendix, last column.)

Explaining Mutual Fund Fees: MER Models

Market Structure. We estimated three single-equation models for MER, using different sets of measures for Market Concentration, Fund Performance, and Fund Characteristics. See Table 3. The alternate specifications were remarkably robust: Market Concentration was a very significant determinant of MER, but the three sets of concentration measures all produced equations of equivalent statistical fit. Regression 1 used the HHI as a single measure of concentration. Regression 2 replaced HHI with its components V and N (see equations 3 and 4 above). Regression 3 used the Hannan measurements V/N and 1/N. All of these variables had significant t-ratios. The MER regression results strongly confirmed our expectation that market structure is positively related to management fee-setting in mutual funds. That is, mutual funds in categories that were highly concentrated (high HHI), had few strong competitors (N), and had a high CV tended to charge high management fees. Competition within fund categories has a significant impact on MERs.

The relationship between price and number of competitors has been documented in many non-financial industries (Besanko et al., 2004, pp.228-229). If the variation of asset sizes is high, however, it does not follow that all funds in a category will charge the same fee. If a category is dominated by a small number of giant funds, most funds will follow the leader in setting their fees because the pay-off from undercutting them may be small, especially if there is threat (or fear) of retaliation. A few small funds may still try to grab some market share by undercutting the leaders' fees; and, if they have some product differentiation, they might have some success (Besanko et al., 2004, pp.272-277). But it does not follow that all funds in a category will copy the leaders' pricing. The variation in MERs among funds within a category requires more study.

Fund Performance. Our equations measured the effect of fund performance on MERs, but here the results gave us some surprises. The Sharpe index, S, which is a measure of return, was negatively related to fund fees in all three equations. Our

TABLE 3

PRICE EQUATIONS FOR MER MODELS

	Equation 1		Equation 2		Equation 3	
Adusted Rsq	0.351		0.353		0.351	
Standard Error	0.520		0.519		0.519	
Obseravations	4.885		4.885		4.885	
Regressor	**Coefficients**	**t-Ratios**	**Coefficients**	**t-Ratios**	**Coefficients**	**t-Ratios**
Intercept	2.339	38.833	2.217	27.313	2.375	39.789
Market Concentration						
HHI (sector)	0.000	3.162				
N			0.000*	-5.326		
V (sector)			0.043	3.442		
V/N					0.847	3.848
1/N					-9.313	-2.711
Fund Performance						
S	-0.161	-6.682	0.167	-6.983	-0.168	-7.002
RSQ	-0.759	-13.452	-0.761	-13.600	-0.793	-14.052
BETA	0.143	3.799	0.137	3.656	0.122	3.232
STDEV	*0.000*	*0.067*	*0.001*	*0.167*	*0.001*	*0.465*
Fund Characteristics						
Ln Assets	-0.102	-24.147	-0.101	-24.163	-0.102	-24.150
Age	*0.001*	*0.928*	*0.001*	*0.803*	*0.001*	*1.054*
Inst	-0.615	-24.557	-0.618	-24.757	-0.616	-24.589
Closed	0.475	11.893	0.476	11.928	0.475	11.877
Taxable	-0.002	-3.574	-0.003	-3.750	-0.003	-3.593
Cash	0.005	4.268	0.006	4.306	0.005	4.136
FAMASS	0.000	-12.128	0.000	-12.134	0.000	-11.971
FAMSIZE	0.001	14.381	0.001	14.688	0.001	14.676

Note:
*The actual coefficient of N in regression 2 was not zero. The coefficient was 9.6179E-06, and N is a large number between 50 and 2,660. Therefore, N has a small, but statistically significant, impact on MER.

Definitions of Variables:
HHI: Herfindahl-Hirschman Index as calculated in equation 3
V: the coefficient of variation of the asset sizes of the mutual funds in the category
N: the number of funds in the segment.
S: Sharpe Index, as defined in equation 9
RSQ: the square of the correlation ratio, over five years, of a fund's share price (NAV) and a broad market index, such as the Standard & Poor 500 Index
BETA: a measure of the riskiness of a mutual fund relative to the risk premium of the general market; see equation 6
STDEV: standard deviation of the rates of return of a mutual fund over time
lnASSETS: logarithm of the mutual fund's assets to show a fund's relative size
AGE: age of a fund in years since inception
INST: a binary variable where X=1 if the fund has a minimum initial investment requirement of $100,000 or more, and x=0 otherwise.
CLOSED: a binary variable where X=1 if the fund is currently closed to new investors, and x=0 otherwise
TAXABLE: a binary variable where X=1 if the fund manages its portfolio so as to reduce tax liability of shareholders (such as by limiting short-term capital gains), and X=0 otherwise.
CASH: ratio of cash assets to total assets as a measure of a fund's liquidity
FAMASS: total assets managed by all funds in the family of mutual funds to which the mutual fund belongs
FAMSIZE: total number of funds in the family of mutual funds to which the mutual fund belongs

highly significant coefficients of S suggest that, other things the same, funds with relatively higher risk-adjusted rates of return are actually less expensive to own. Fund managements with solid portfolio performance apparently are not exploiting their comparative advantages when it comes to fee-setting.[6]

Our sample also shows that funds whose performance is correlated with the general market (RSQ) have lower fees. RSQ only shows consistency in direction in the price of fund shares and in the direction of change in a market index. This may relate to operating costs, because funds that closely track the broad market are less costly to run. On the other hand, BETA was significantly and positively related to MER. BETA concerns sensitivity: a large positive value of BETA shows that a rise in a market index is correlated with a multiple increase in fund share value. BETA was positively related to MER, although fund performance in general appeared to have influence on management fee-setting.

Fund Characteristics. The eight variables in this group were selected because of their empirical or a priori relationship to investor demand or operating cost. Two variables provided information about the mutual fund family to which a particular fund belongs. The influence of fund family has not been explicitly included in past studies. The number of funds in the family, FAMSIZE, is positively correlated with MER. This relates to the economies of scope of the investment company providing the funds. If the company furnishes a broad selection of investment substitutes, it becomes attractive to a benefits manager or employee-investor, and the investment company takes advantage some of this attractiveness by keeping MER high. The investment company engages in umbrella branding so that clients attach brand image or attributes to all funds in the family (Besanko et al., 2004, pp.86-88).[7] Umbrella branding also provides scope economies in advertising.

The total amount of assets under management by an investment company family seems to provide scale economies in operations, which is indicated by the negative regression coefficients of FAMASS in all three regressions. These results show the importance of family characteristics in understanding the costs and marketing advantages of mutual funds.

An important set of characteristics concerns the nature of a mutual fund's assets. The first is asset size, expressed as the natural logarithm of all assets under management by the fund, lnASSETS. As expected, the negative relationship of this to MER reveals strong economies of scale. The logarithm shows that as size increases unit cost of money management falls, but at a decreasing rate. There is a limit to the advantage of size.

We included a variable to measure the AGE of a fund on the expectation that managers benefit from a learning curve that will decrease the average cost of operations over time (Besanko et al., 2004, pp. 95-100). This study did not find evidence of a learning curve. We also expected that the proportion of CASH assets in a fund's portfolio would exert upward pressure on MER because, while portfolio liquidity eases the management of share sales by investors, cash assets produce little income and this drags down return on total assets. This was confirmed by our results since the coefficients of CASH were significant and positive.

A large number of funds market themselves to institutional investors by having minimum asset sizes for purchasing shares. These minimums range from as little as $100,000 (which was our threshold) to as much as several million dollars. Large investors in these funds benefit from scale economies by paying low MERs. Thus, the institutional binary variable INST has a negative coefficient: on average, institutional investors pay an annual MER that is about 0.6 percent less than that charged non-institutional investors.

Funds that are, or were, closed are usually very attractive to investors, and investors are willing to pay richer management fees for their services. That accounts for the positive coefficient of the binary variable CLOSED.

The reverse of this occurs when a fund has a large proportion of assets with large taxable gains that will soon increase the tax liability of investors when gains are distributed. These funds generally have relatively low MERs to offset their disadvantaged tax liability status. That is reflected in the negative coefficient of the binary TAXABLE variable.

Conclusions

Mutual funds are the primary investment vehicle for holding assets in employee retirement plans. During a worker's job tenure these assets accumulate and these accumulations determine retirement benefits. We have shown that the management expense ratio of mutual funds is important in determining the size of retirement plan accumulations.

An employer's benefits manager who is responsible for

[6]A perverse theory of mutual fund fee-setting is that poorly performing funds fear that they will not survive competition from other funds. They will charge high fees to seek excess profit in the last few years of life before exiting the market (Chordia, 1996). In such cases MERs and performance will be negatively correlated. But there is no evidence that this is the pervasive situation.

[7]Umbrella branding is widely recognized in consumer goods marketing by using widely known family names on all of a producer's products, e.g., Coke and Diet-Coke. Vanguard always attaches the Vanguard name to each of its mutual funds so that the low-fee vision of Vanguard is attached to each of its funds.

administering a defined benefits plan must understand the mutual funds marketplace so as to control the firm's cost of the plan. A benefits manager who sets up a defined contribution plan selects mutual funds that employees will use in managing their individual retirement plans. In selecting the mutual funds the benefits manager essentially determines the costs of plan management that is carried by the employees. The benefits manager should understand the structure of mutual fund submarkets (categories) to select funds wisely. There is no conclusive evidence that high-cost mutual funds provide superior returns.

This paper provides models of MERs in an effort to better understand the economics of the mutual fund market place. Our analysis covered 15 categories of the market. Our most important finding was that the market structures varied among these categories and that these structures provided different degrees of pricing power. In the less competitive categories, mutual funds could use their pricing power to maintain high management fees. In more competitive categories, fees are likely to be lower.

Aside from market structure, we estimated several other determinants of MERs. Fund investment performance provided some puzzling results such as a negative correlation of the Sharpe ratio and the MER. We also found that the size of the investment company that provides mutual funds strongly influences the MERs of individual funds in its family.

More research is necessary to understand the dynamics of fee-setting in the huge mutual fund market, which plays such a large role in retirement savings. ■

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APPENDIX

FUND ASSETS, BY CATEGORY:VALUE LINE UNIVERSE (n=7,457)

	Number of Funds	Total Assets ($ billions)	Coefficient of Variation	Herfindahl-Hircehman Index
General Equity				
Aggressive Growth	363	165	3.68	399
Growth	2,660	1,106	5.28	108
Growth/Income	887	804	5.17	312
Income	261	104	4.42	785
Small Company	1034	289	4.47	203
Intenational Equity				
European Equity	92	17	4.07	1,885
Foreign Equity	879	280	4.90	284
Global Equity	385	161	5.25	739
Pacific Equity	120	12	3.16	910
Specialty Equity				
Energy	68	12	2.71	1,214
Financial Services	116	15	5.58	375
Health	157	40	5.94	2,299
Precious Metals	50	7	1.34	553
Technology	289	49	2.58	265
Utilitites	96	13	2.32	659

* All equity mutual funds with reported assets