Department of Economics
and
Institute for Policy Analysis
150 St. George Street
Toronto, Ontario M5S 3G7
Canada

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The Determinants of Management Expenses

Michael K. Berkowitz
Yehuda Kotowitz

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email: berk@chass.utoronto.ca

The Determinants of Management Expenses[1]

by

Michael K. Berkowitz
University of Toronto, Department of Economics and Faculty of Management
150 St. George St., Toronto, Ontario M5S 3G7
(416) 978-2678; email: berk@chass.utoronto.ca

and

Yehuda Kotowitz
University of Toronto, Department of Economics
150 St. George St., Toronto, Ontario M5S 3G7
(416) 978-4181; email: yehuda@chass.utoronto.ca

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by Michael Berkowitz & Yehuda Kotowitz

ABSTRACT

This paper develops a model which explains the determinants of the management expenses charged by U.S. equity funds. The study shows that for high quality managers, an increase in quality is associated with higher fees. In contrast, as the quality of the lower quality managers deteriorates, their fees increase. A non-linear negative relationship is found between the size of a fund and its management expenses. Economies of scope are also shown to exist between the number of funds within a mutual fund complex and the management expenses charged investors. Finally, while 12b-1 fees have been thought of as a substitute for load charges, this paper suggests that they are complements.

The Determinants of Management Expenses

1.0 Introduction

Each year mutual fund managers receive a management fee typically computed as a percentage of the fund's average net assets. The fee usually varies from .50% to 1.50%. In most instances, the fees are charged on a sliding scale that declines with the size of the fund. In addition to the fees, in 1980, the SEC introduced the 12b-1 plan that permits funds to deduct as much as 1.25% of average net assets per year to be used to cover distribution costs such as advertising, commissions paid to brokers and general marketing expenses. Other administrative costs of operating a fund include the costs of compliance with security regulations, auditing and legal fees. The sum of these management and administrative costs expressed as a percentage of average net assets is known as the management expense ratio (MER).

For the sample of 1065 U.S. equity funds covered on Morningstar's May 1996 OnDisc, the mean MER was 1.29%, ranging from a low of 1.16% for Growth-Income funds to 1.61% for Aggressive Growth funds. Because the average net asset value of the funds was $812.2 million, the average gross expense per fund was $10.48 million, or $11.16 billion for the entire sample of U.S. equity funds. This sum is certainly not a trivial amount, yet there has been little discussion in the literature about the determinants of these expenses.

In number of related studies, Sharpe (1966) concluded that funds that performed well had lower expense ratios than those that performed poorly. Friend, Blume and Crockett (1970), on the other hand, were not able to substantiate Sharpe's earlier results. Baumol et al (1990) found scale economies as well as economies of scope in the cost structure of mutual fund complexes[2] which they argued must be considered in evaluating mutual fund fees. Recent studies in the area that are particularly relevant to our examination of management expenses include the work of Ferris & Chance (1987) and Gruber (1996). Ferris & Chance examined the effect of 12b-1 plans on mutual fund expense ratios. The authors tested a model that attempted to explain the cross-sectional variation in expense ratios across funds using size, objective, load and presence of a 12b-1 plan. The authors concluded that, as expected, the presence of a 12b-1 plan was only a dead-weight cost and that investors accept this cost because they know very little about it and even less on how to evaluate its economic impact.

In his 1996 presidential address to the American Finance Association, Professor Elton Gruber (1996) focussed on the growth in the mutual fund industry. Because both "good" and "poorly" managed funds sell at net asset value, Gruber argued that management per se appears not to be priced in the market. The counterargument to this is that management is priced in the long run, because management raises the fees and expenses it charges customers to reflect "good management". Gruber presents evidence, however, showing that high fees are associated with inferior rather than superior management. None of the papers we are aware of present an explicit model of fee setting explaining the observed relations to the variables investigated.

This paper develops an explicit profit maximization model which explains why an inverse relationship exists between performance and management expenses for poorly managed funds and why a direct relationship exists for those funds that perform well. The basic premise is that high

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[2] A mutual fund complex is an organization offering a range of financial intermediary and investment services. A complex may consist of several mutual funds, private investment counseling services as well as brokerage activities. Each mutual fund within a complex is a separate legal entity with a separate contract with the same advisor for investment management services.

fees lead to lower measured performance evaluations in the future and, hence, lower future market shares. Since future fees are directly linked to future market shares, the manager must trade off the immediate benefits of a fee hike against the future costs associated with that increase in fees. This trade off is shown to critically depend upon the quality of the manager and the expected life of the fund. A number of interesting observations follow from our empirical analysis:

i. Management expenses decrease non-linearly with an increase in fund size;

ii. The better of the poor performing funds have lower MER's than do those funds at the lowest end of the performance spectrum while improved performance leads to higher MER's for funds that perform well in the past;

iii. 12b-1 expenditures complement load charges and are most common for back-loaded funds;

iv. Companies charge close to the maximum allowed 12b-1 fee;

v. There appear to be some economies of scope with respect to the number of mutual funds within the same fund complex;

vi. Funds with more conservative objectives have lower MER's than do funds with more aggressive objectives; and

vii. Fund managers that turn their portfolios over more often have higher MER's than those following a more passive strategy.

The paper is organized as follows. Section 2 develops the model and comparative static results. Section 3 discusses the variables while Section 4 describes the data used in the study. Section 5 presents the empirical results and Section 6 is by way of summary and conclusions.

2.0 Model

MER's are prices (or fees) which investors pay to funds for management services. We assume that the determination of management fees is no different than that of other prices. All other things equal, an increase in management fees produces a direct increase in the present value of the cash flows to the manager. At the same time, the increase in fees reduces returns. In response, investors shift their capital to higher net return funds, reducing future fund revenue. Assuming that managers choose fees optimally, the marginal benefits and costs associated with a change in fee are equated for each fund.

To formalize the argument, define net fund profit per unit time (π_t):

$$\begin{aligned} \pi_t &= fN_t - C_0 - C(N,q,z) \\ C_N &> 0;\ C_q < 0;\ C_{Nq} < 0 \end{aligned} \tag{1}$$

where f is the management expense ratio; N_t represents total net asset value at the end of the period; C is the variable cost of fund management, an increasing function of the size of the fund with average and marginal costs decreasing in the quality of the management (q). z is a vector of variables likely to affect operating and marketing conditions, such as the existence and nature of load charges, allowable 12b-1 expenditures, fund objectives, asset turnover and the size of the fund family. The expenses include advertising expenses, accounting and legal fees as well as the costs of communicating with unitholders. Trading costs are excluded since they are deducted from fund income prior to the determination of the net asset value. We assume that there are fixed costs of operations (C_0) and that the variable costs are increasing in size and decreasing in management.

Investors are assumed to allocate their capital among funds on the basis of expected performance (net of fees), which is determined by the quality of management. As quality is unknown, investors are assumed to base their expectations on past performance.

In order to simplify the exposition we assume that investors adjust their holdings in response to changes in past performance so that market shares (M_t) change according to the following simple process:[3]

$$\frac{dM_t}{dt} = \psi(\alpha) - (1-\lambda)M_t \tag{2}$$

where $\psi(\alpha)$ is that part of the change in market share due to the past performance of the fund. Performance is measured by Jensen's alpha[4]. λ is the period to period persistence in market share. For any period t, the market share can be expressed as:

$$M_t = M_0 e^{-(1-\lambda)t} + \frac{\psi(\alpha)}{(1-\lambda)}[1 - e^{-(1-\lambda)t}] \tag{3}$$

Alternatively, in terms of the fund's net asset value, we have

$$N_t = \left[M_0 e^{-(1-\lambda)t} + \frac{\psi(\alpha)}{(1-\lambda)}[1 - e^{-(1-\lambda)t}]\right] e^{gt} \sum N_0 \tag{4}$$

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[3] Berkowitz & Kotowitz (1992, 1997) show that in both the Canadian and the US markets, expectations of future performance are based upon past performance.

[4] See Jensen (1968). We have chosen alpha as a measure of performance in the interest of simplicity and comparability with other studies, e.g. Berkowitz & Kotowitz (1997), Gruber (1996), Ferris & Chance (1987), although we are aware of its potential deficiencies as shown by Carhart (1997).

where g is the growth rate for the industry.

Fund managers set fees (and other variables) to maximize the present value of lifetime profits. The life of any fund, T, is a function of both its initial market share, M_0, and the performance of the fund. The objective is then to choose f so as to maximize the present value of the net benefits to the fund as specified in (1) subject to the net asset value specification in (4).[5] The solution to this problem is an equation implicit in the optimal fee:

$$\frac{(1-\lambda)M_0[1-e^{-\delta T}]}{\delta} + \int_0^T [\psi(\alpha) - (f^* - C_N)\frac{\partial\psi}{\partial\alpha}][e^{-\gamma t} - e^{-\delta t}]dt = 0 \qquad (5)$$

where $\delta = r + (1-\lambda) - g$, $\gamma = r - g > 0$ and r is the rate of discount. Assume for simplicity a linear relationship between past performance and changes in market share, i.e. $\psi(\alpha) = a + b\alpha$ where $\alpha = q - f$. We can then solve explicitly for the optimal fee.

$$f^* = \frac{(1-\lambda)M_0[1-e^{-\delta T}]}{2b\delta A} + \frac{a+bq}{2b} + \frac{1}{2A}\int_0^T C_N[e^{-\gamma t} - e^{-\delta t}]dt \qquad (6)$$

where $A = \frac{1 - e^{-\gamma T}}{\gamma} - \frac{1 - e^{-\delta T}}{\delta} > 0.$

From (3), in the steady state, the market share each period is simply equal to $[a+b(q-f)]/(1-\lambda)$. The existence of fixed costs defines a minimum market share ($\bar{M}$) sustainable

[5] The assumption here is that f is constant. This is because a significant part of the MER is composed of advisory fees which cannot be easily and frequently changed. A comparison of MER's in 1994 and 1996 for the 546 funds used in our study, and available in each of the two years, shows a mean difference in MER's of .0096% which is consistent with our assumption.

over a long period. Let T be the period in which the firm ceases to exist once it falls below the critical market share. Specifically, T is defined by the following:

$$\bar{M} = M_0 e^{-(1-\lambda)T} + \frac{a + b(q - f)}{(1-\lambda)}[1 - e^{-(1-\lambda)T}] \tag{7}$$

If [a+b(q-f)]/(1-λ) > $\bar{M}$, then irrespective of the initial market share, the firm will continually grow with an infinite expected life. From (6), the optimal fee is then simply:

$$f^* = \frac{(1-\lambda)M_0}{2b\delta A'} + \frac{a + bq}{2b} + \frac{1}{2A'}\int_0^\infty C_N[e^{-\gamma t} - e^{-\delta t}]dt \tag{8}$$

where A' = (1/γ) - (1/δ).

Declining funds, for which the steady state is short of the minimum sustainable market share, will terminate operations once the minimum share of the market is attained. Their optimal fees are represented directly by the expression in (6).

We can now examine how the optimal fee changes with respect to the quality of the fund manager and size of the fund. Looking first to high quality and, hence, growing funds with an infinite expected life, from (8), a change in quality has the following effect on optimal fees:

$$\frac{\partial f^*}{\partial q} = \frac{1}{2} + \frac{1}{2A'}\int_0^\infty [C_{Nq} + C_{NN}\frac{\partial N}{\partial q}]\,[e^{-\gamma t} - e^{-\delta t}]dt \gtrless 0 \tag{9}$$

Although the second term in (9) is negative, we expect that ∂f*/∂q > 0 because the main effects of better management are likely to be reflected in improved (gross) performance, rather than in reduced operating costs. Better managers are likely to appropriate some of the benefits of improved performance in the form of higher fees.

For those funds with a finite life, from (6),

$$\frac{\partial f^*}{\partial q} = \frac{1}{2} + \left[\frac{M_0(1-\lambda)e^{-\delta T}}{2b\delta A^2}[\delta A-(1-e^{-\delta T})(e^{(1-\lambda)T}-1) + \frac{(e^{-\gamma T}-e^{-\delta T})}{2A}[C_N(T)-\frac{1}{A}\int_0^T C_N(e^{-\gamma t}-e^{-\delta t})dt]\right]\frac{\partial T}{\partial q}$$
$$+ \frac{1}{2A}\int_0^T [C_{Nq}+C_{NN}\frac{\partial N}{\partial q}][e^{-\gamma t}-e^{-\delta t}]dt \gtrless 0 \qquad (10)$$

Assuming C_{Nq} and C_{NN} are constant, comparing equation (10) to (9), we see that (10) contains an additional term which is enclosed within the large brackets, times $\partial T/\partial q$. This term represents the effect of quality on the optimal fee through its effect on expected fund life. Since $\partial T/\partial q$ is positive, as shown in the Appendix, comparison of (9) and (10) depends upon the sign of the expression within the large brackets. It can be shown that the first term is negative and becomes stronger as T becomes shorter which is our expectation for low quality funds.[6] As long as the marginal cost term, which is ambiguous in sign, is dominated by the first term, the expression within large brackets is negative and suggests that for low quality funds, an increase in quality has less effect on fees than a similar increase for high quality funds. It may be, moreover, that the effect of a decrease in quality for low quality funds is to actually induce an increase in fees, in contrast to the positive relationship expected for high quality funds.

The intuition for this is as follows. Since lower ability managers expect to hit the critical size level in a relatively short time period, their time horizon is quite short. All other things equal, the lower the ability of the manager, the shorter is the time frame for the fund. For such managers, the benefit from an increase in fees outweighs the present value of lost fees in the future. This

[6] Proof available from authors.

suggests a negative non-linear relation between quality and fees with the negative effect strongest for the lowest quality managers.

The effect of initial fund size on optimal fees can be analyzed by looking at the derivative of f* with respect to N_0. For high quality managers, we have

$$\frac{\partial f^*}{\partial N_0} = \frac{(1-\lambda)}{2b\delta A' \sum N_0} + \frac{1}{2}A'\int_0^{\infty} C_{NN}[e^{-\gamma t} - e^{-\delta t}]dt \ \gtrless \ 0 \tag{11}$$

Since $C_{NN} < 0$ and as ΣN_0 is large, $\partial f^*/\partial N_0 < 0$ for the high quality funds. For poor quality funds, assuming C_{NN} is constant, an additional term is added to (11).

$$\frac{\partial f^*}{\partial N_0} = \frac{(1-\lambda)(1-e^{-\delta T})}{2b\delta A \sum N_0} + \frac{1}{2A}\int_0^{T} C_{NN}[e^{-\gamma t} - e^{-\delta t}]dt$$
$$+ \left[\frac{M_0(1-\lambda)e^{-\delta T}}{2b\delta A^2}[\delta A-(1-e^{-\delta T})(e^{(1-\lambda)T}-1)] + \frac{(e^{-\gamma t}-e^{-\delta t})}{2A}[C_N(T)-\frac{1}{A}\int_0^T C_N(e^{-\gamma t}-e^{-\delta t})dt]\right]\frac{\partial T}{\partial N_0} \ \gtrless \ 0 \tag{12}$$

The attached Appendix shows that for a poor quality fund, $\partial T/\partial N_0 > 0$. As argued earlier, we expect the term in brackets to be negative so that we anticipate that for poor quality funds, the negative relationship between size and fees is stronger than it is for high quality funds.

3.0 Estimation of the Model

The estimating equations in (6) and (7) are not sufficiently specific to yield an exact functional form. However, our comparative statics suggest some distinct non-linearities and differences between growing (high quality) and declining (low quality) funds. We therefore estimate the model first in a linear approximation using the entire sample of funds and then separately for 'high quality' and 'low quality' funds with different functional forms for the key variables.

In estimating the model, we must use proxy variables for fund quality since actual quality is not observable. In common with investors, we use measures of **ex post** performance as proxies for quality. While the correct measurement of **ex post** performance is under considerable debate, we have chosen to use gross (q) or net (α) risk-adjusted returns based on the fund's beta. Previous research (Berkowitz & Kotowitz, 1997) suggests that investors respond to differences in alpha in their fund allocations. The use of alpha is also consistent with other studies and media descriptions of fund performance.[7]

Either measure of quality involves a measurement error. Gross risk-adjusted returns include expenses necessary to obtain the return which should be excluded, while net risk-adjusted returns omit discretionary fees, which should be included. To the best of our knowledge, information on the composition of fees into their discretionary and non-discretionary components is not available. Moreover, both proxy measures are subject to an error in the measurement of risk. Therefore, we report the results based upon both proxies for fund quality.

The comparative static results suggest that quality is likely to affect fees differently for 'high quality' funds whose steady state market share is above the minimum share and 'low quality' funds whose market share is below the critical level. Funds with non-negative alphas are assumed to belong to the 'high quality' group while those with negative alphas are assumed to belong to the 'low quality' group. From our earlier discussion, we expect that for high quality funds, a positive

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[7] Most of the periodic media summaries of mutual fund performance include either ALPHA directly or its components.

relation exists between quality and fees. We do not have any a priori indications of significant non-linearities between quality and fees for this group. In contrast, for low quality firms, we expect a significant negative effect on fees due to the increase in expected fund life attributable to increased quality. It is clear that this effect is non-linear and declining in T. Consequently, we expect the negative effect to increase as quality falls.

An interesting implication of this relationship for low quality managers is that the lower the quality and, therefore, lower the expected time horizon of the fund manager, the greater is the incentive to take on additional risk. Failing to achieve success, the management company can merge the poor performer within another fund within its family and bury the historical performance of the poor performer forever. The SEC requires citing only the surviving fund's track record.[8]

From our earlier discussion, the comparative statics suggests a negative relationship between size and fees with this effect being stronger for low quality funds than it is for high quality funds. As the main determinants of the relation between size and fees are economies of scale, it is reasonable to expect them to diminish in size. This is supported by Ferris & Chance (1987) who find a negative logarithmic relation between size and fees.

In addition to fund quality and size, we also consider a set of other variables. For example, the number of funds within the management company complex may affect the fees charged. As the size of the fund family increases, many of the administration and research costs can be spread over more funds which decreases the average cost per fund within the group. As

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[8] According to an article in *Mutual Fund Magazine*, April 1997, "Mercy Killings", this practice has become quite common.

the number of funds increases, we expect the average cost to become flatter with little, if any, economies of scope associated with larger groups.

Berkowitz & Kotowitz (1997) have suggested that there exists a segmentation of the mutual fund market between naive and sophisticated investors into load and no-load funds, respectively. In contrast, Ferris & Chance (1987) argue that no-load funds must rely more heavily on advertising and other 12b-1 expenses than do load funds, which can rely upon agent's commissions (excluded from expenses), thus leading to higher expenses for load funds. In order to examine these relationships we include load dummy variables together with 12b-1 fees as possible explanators of expense ratios.

We also examined the effect of the age of the fund upon its management fees. Ferris and Chance suggest that there might be a learning-curve effect which might enable an older fund to operate more efficiently and, therefore, charge lower fees.

In order to capture any distinction in management fees that might be associated with different investment objectives between funds, we included a dummy variable for each of the four objectives, excluding Aggressive Growth funds which serves as the benchmark. The motivation for including the fund objective is that the performance measure which we use (alpha) may not fully capture the risks associated with alternative investment styles. Furthermore, different objectives may be associated with different levels of research and trading expenses.

The final variable used in the analysis was the turnover of the fund. Although brokerage fees are not included in the fees charged, funds that turn over their portfolios more often are likely to require higher research expenditures in comparison to 'closet index' funds. Our expectation is that funds that have higher turnover ratios, ceteris parabis, will have higher fees.

4.0 Description of the Data

The data used in this study were obtained from Morningstar's Mutual Fund OnDisc, May 1996. The complete sample of U.S. equity funds consisted of 1065 firms. We eliminated index funds which are not actively managed and other funds with MER's less than .30 since most of those funds are managed for organizations or are otherwise restricted to specific types of investors. This resulted in a final sample for use in estimation of our models of 1015 funds.

Tables 1a-1c describe some of the salient characteristics of these funds. The division into load and no-load funds is relatively equal as is the split between funds with positive and negative alphas. The load funds are generally larger than the no-load funds and those funds that performed well are generally larger than those that performed poorly, though the size variance is significantly greater for funds with negative alphas. The better performing funds have both lower MER's on average, as well as lower variance, and lower 12b-1 fees, and variance, than the poor performing funds. While this relationship holds across fund objectives for the MER's, it does not hold uniformly across objectives for 12b-1 fees.

5.0 Empirical Results

We conjectured at the outset that older funds might be more efficient, but throughout our investigation, we found the age variable was an insignificant explanator of MER's, as did Ferris and Chance in one of their samples, so we omitted the variable from further analysis. Also, the Small Company dummy variable coefficient was consistently insignificant and it was dropped from the analysis as well.

Although we present our results based upon both net returns (alpha) and gross returns (q), there is little difference in the conclusions that one draws from the analysis using either measure of quality. Since the results based upon net returns are somewhat better, we shall focus on them throughout our discussion.

Initially, we examined the composition of the expense ratio for the entire sample of 1015 funds. Table 2a presents the results for the linear model using net risk-adjusted returns as the proxy for quality while Table 2b uses gross risk-adjusted returns as the quality proxy. As expected, fees are negatively related to the logarithm of size rather than to size. The logarithm of size performs consistently better throughout the analysis so we will report only the results based upon the transformed size variable. Although the variables are generally significant and consistent in the two tables, the level of explanation is quite weak across all models. Of particular interest in these results is that whether quality is measured by net or gross returns, quality is negatively related to fees. The linear models presented in Tables 2a and 2b, although weak in their explanatory power, do serve well as a comparative benchmark to show the impact of introducing non-linearities and differences in quality on fees charged.

Our theory suggests a difference in the fees/quality relationship for funds that performed well in the past versus those that performed poorly. In particular, our theoretical model predicts a positive relationship for the better performing funds and a negative relationship for the poor performers. To test this, we divided the sample into those funds which had negative performance measures over the last 36 months and those which had positive performance measures over the same period. The under-performing sub-sample consisted of 518 funds while the over-performing sub-sample consisted of 497 funds.

Table 3a presents the results for the poor performing funds using alpha as the quality proxy. A comparison of Model 5 which used a quadratic specification for fund performance with the linear performance assumption in Model 6 and the logarithmic performance assumption in Model 7 suggests that, as expected, the quadratic performance assumption best fits the data due to the short time horizon facing these managers. The lower is the quality of the manager, the greater the sensitivity of fees to quality. For the funds that performed well in the past, a comparison of Models 5, 6 and 7 in Table 3b shows that while the expense ratio is logarithmically related to the level of performance, the relationship is quite flat. The linear and quadratic specifications are practically indistinguishable from the logarithmic form. The results suggest, as equation (6) predicts, for high quality managers, an increase in quality results in higher fees.

As predicted, the results in Tables 3a and 3b show large differences between positive and negative alphas. A comparison of the standard error of the linear alpha model (equation 5) using the overall sample of funds in Table 2a, which is .634, with the average standard error of the equivalent regressions in Tables 3a and 3b, which is .501[9], shows a significant improvement in explanatory power from differentiating the sample into positive and negative alpha funds. What is clear is that the results in Table 2a are dominated by the poor performing funds within the sample. The probable cause of this is the large variance of the MER's for the funds with negative alphas relative to the variance for the funds with positive alphas as can be seen in Tables 6b and 6c.

When the funds are combined in a single sample and only differentiated by past performance, the results in Table 5a confirm our theoretical predictions of a negative relationship between MER and quality for funds that performed poorly and a positive relationship for those

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[9] $\{[(.281)^2 \times 497 + (.645)^2 \times 518]/1015\}^{½} = .501$

that performed well in the past.[10]

Tables 3a and 3b are also consistent with the negative relationship between MER's and size of funds that was predicted in our model. Moreover, for the funds with negative alphas, the impact of size on MER's is significantly greater than it is for the sample of funds with positive alphas which was also predicted by our theoretical model.

The results for Model 5 in each of Tables 3a, 3b and 5a suggest that funds with more conservative objectives have lower fees relative to the Aggressive Growth funds. This is consistent with the hypothesis that more aggressive management styles are associated with greater research expenditures. The finding is also consistent with the hypothesis that beta is an incomplete measure of risk across funds so that the riskier Aggressive Growth funds have performance measures which are higher than their actual performance.

The effects of size and the number of funds within the management group are also as we expect. Even for poor performing funds, the results suggest the presence of economies of scope. In order to examine the number of funds for which there exists economies of scope, we created individual dummy variables denoting one fund within the complex, two or fewer funds, etc. The results of these alternative specifications showed that economies of scope existed with two or more equity funds and did not increase as the number of funds exceeded two in the complex.[11]

Our earlier hypothesis was that funds that turned their portfolios over more often spent more on research so that we would expect a positive relationship between turnover and MER's.

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[10] The combined model was also estimated with size differentiated by positive and negative alpha funds, but the differences in size coefficients were not significant so we do not present them here.

[11] Because the MGTCO variable was constructed only on the basis of the number of equity funds within the complex and excludes fixed income funds, the scope effect may be underestimated.

This expectation is confirmed across our models. The coefficient on turnover is positive and generally significant.

It has been suggested by Ferris & Chance that 12b-1 fees are a substitute for load fees. We examined this proposition within the context of our model. Tables 6a-6c describe the load and 12b-1 characteristics of our sample. These tables show that there were no funds in the sample that had both front and rear loads. Of the load funds, almost 78% are front-end loaded. While only 21.2% of the no-load funds have 12b-1 plans, 75% of the front load funds and 99.1% of the deferred load funds have 12b-1 plans. The high percentage of load funds that also have 12b-1 plans suggest that 12b-1 fees complement load charges and are not a substitute for load charges as Ferris & Chance have suggested.

Another interesting feature of the data is the size of the 12b-1 fee. Funds with deferred loads have mean 12b-1 fees approximately three times the mean 12b-1 fee for those funds with front end loads or no-loads. This together with the near unanimity among deferred load funds choosing 12b-1 plans suggests that for these funds, 12b-1 fees are substitutes for front-end load charges.

Table 6a shows that 80% of the load funds within our sample also have 12b-1 plans which suggests that these broker incentives are not substitutes. The size of the 12b-1 fee, moreover, is at least as high for load funds as it is for no-load funds. The complementary relationship between load and 12b-1 fees suggests that the addition of a load variable[12] may have little explanatory value which is exactly what our empirical results found. We therefore dropped load as an

[12] Front end and deferred load values as well as dummy variables for load were examined with none of the load related variables being significant when 12b-1 fees were also included in the model.

explanator. It appears that 12b-1 charges are part of the marketing package of load funds to induce advisors to direct investors to themselves.

The results of regressing 12b-1 fees on MER's are highly significant and robust across models and quality differences among fund managers. In each model, the coefficient on the 12b-1 fee is close to 1.0 indicating that funds charge close to the maximum allowed 12b-1 fee.

6.0 Summary and Conclusions

This paper has developed a model for explaining the determinants of management fees within mutual funds. The predictions of the model are tested using a sample of U.S. equity funds. A number of interesting results are derived, some of which disagree with currently accepted wisdom.

We find that larger funds have smaller MER's with the MER decreasing at a decreasing rate with size. We also find that better managers charge higher fees, appropriating some of the benefits associated with improved performance. At the same time, for low quality managers, as their performance deteriorates, they increase their fees since the benefit from an increase in fees outweighs the present value of any lost fees in the future associated with a decrease in market share of the fund.

The paper has also shown that more conservative funds have lower fees than their more aggressive counterparts possibly due to greater research expenditures paid by the latter group. At the same time, high turnover rates appear to be symptomatic of operating inefficiencies. Those funds with 12b-1 plans, moreover, appear to charge close to the maximum fee allowed.

While economies of scope have been shown to be quite strong, the cost reducing benefits associated with additional funds appears to decline rapidly. Yet, we see approximately 870 of 1015 equity funds within our sample associated with management companies containing 2 or more equity funds. One reason for this is that the greater the number of funds within the complex, the easier it is for the management company to bury the historical record of its losers. This greater ability to hide the history of the poor performing funds as the number of funds within the management complex grows is not captured within our model and is certainly worthy of future study.

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Appendix

Define F as the difference between the fund's market share at T and the critical size below which the fund siezes to exist, i.e.

$$F = M_0 e^{-(1-\lambda)T} + \frac{a+b(q-f)}{(1-\lambda)}[1 - e^{-(1-\lambda)T}] - \bar{M} \qquad \text{(A-1)}$$

It follows that

$$\frac{dT}{dM_0} = -\frac{\frac{dF}{dM_0}}{\frac{dF}{dT}} = -\frac{e^{-(1-\lambda)T}}{\frac{dF}{dT}} \qquad \text{(A-2)}$$

For low quality funds, dF/dT < 0, implying $dT/dM_0 > 0$. Since we are comparing two funds of different sizes at the same point in time, $\sum N_0$ is constant so that the sign of dT/dM_0 is the same as the sign of $dT/dN_{0.}$

When comparing two funds differing in their performance levels,

$$\frac{dT}{dq} = -\frac{\frac{dF}{dq}}{\frac{dF}{dT}} = -\frac{\frac{b}{(1-\lambda)}[1 - e^{-(1-\lambda)T}]}{\frac{dF}{dT}} \qquad \text{(A-3)}$$

Again, since dF/dT < 0, dT/dq > 0.

Glossary of Variables

ALPHA	Measure of the difference between a fund's actual return over the most recent 36-month period and its expected performance given its level of risk as measured by beta. ALPHA = (Return on Fund - Return on T-Bills) - Beta x (Return on S&P500 - Return on T-Bills)
Q	Quality of the fund manager, estimated as ALPHA + expense ratio.
LSIZE	Logarithm of the net asset value of the fund.
12b-1	The maximum annual charge deducted from fund assets to pay for distribution and marketing costs.
EQINC	Funds that seek current income by investing at least 50% of their assets in equity securities with above average yields.
GRINC	Funds that seek growth of capital and current income as near equal objectives by investing in equity securities with above average yields and some potential for appreciation.
GRTH	Funds that seek capital appreciation by investing primarily in equity securities of companies with earnings that expected to grow at an above average rate.
TURNOVER	A measure of the fund's trading activity which is computed by taking the lesser of purchases or sales (excluding all securities with maturities less than one year) and dividing by average monthly assets.
MGTCO	Number of equity funds within the management company complex.
ALPHASQ	$ALPHA^2$
LALPHA	LN(ALPHA)
QSQ	Q^2
LQ	LN(Q)
LMGTCO	LN(MGTCO)
NEGALPHASQ	ALPHASQ for all ALPHA < 0
POSLALPHA	LALPHA for all ALPHA > 0
NEGQSQ	QSQ for all ALPHA < 0
POSLQ	LQ for all ALPHA > 0

Table 1a
Overall Sample
(1015 funds)

	Size (million $)		**MER**		**12b-1**	
Objective	**Mean**	**Var.**	**Mean**	**Var**	**Mean**	**Var**
Aggressive Growth	1,127.82	6,619,656	1.607	.553	.345	.143
Equity Income	931.27	5,212,447	1.220	.180	.225	.092
Growth	777.86	9,111,467	1.333	.567	.226	.094
Growth & Income	1,047.08	9,006,999	1.272	1.042	.226	.090
Small Company	365.72	371,263	1.402	.387	.204	.087
Load	923.97	10,986,672	1.442	.353	.380	.110
No-Load	670.64	3,248,340	1.233	.880	.076	.035
Overall	797.93	7,152,609	1.339	.626	.229	.096

Table 1b
Negative Alpha Funds
(518 funds)

	Size (million $)		**MER**		**12b-1**	
Objective	**Mean**	**Var.**	**Mean**	**Var**	**Mean**	**Var**
Aggressive Growth	161.38	28,741	2.164	1.439	.296	.134
Equity Income	533.16	1,133,895	1.235	.195	.214	.097
Growth	660.42	13,713,220	1.415	.876	.235	.097
Growth & Income	891.92	9,121,658	1.365	1.383	.252	.100
Small Company	151.09	44,049	1.540	1.239	.213	.105
Load	869.32	16,440,371	1.457	.465	.376	.113
No-Load	465.44	2,091945	1.344	1.649	.082	.040
Overall	679.86	9,749,976	1.404	1.024	.239	.100

Table 1c
Positive Alpha Funds
(497 funds)

	Size (million $)		MER		12b-1	
Objective	**Mean**	**Var.**	**Mean**	**Var**	**Mean**	**Var**
Aggressive Growth	1,391.40	8,093,978	1.455	.203	.358	.145
Equity Income	2,219	16,236,119	1.173	.129	.261	.074
Growth	915.16	3,696,977	1.238	.188	.216	.091
Growth & Income	1,413.43	8,545,222	1.053	.167	.163	.060
Small Company	411.20	428,776	1.373	.201	.203	.084
Load	987.93	4,597,098	1.425	.221	.383	.106
No-Load	860.97	4,245,596	1.129	.144	.071	.031
Overall	921.00	4,415,817	1.269	.202	.219	.091

Table 2a

Composition of the Expense Ratio
using Net Risk-Adjusted Returns
(Sample of 1015 funds)

Dependent Variable: Expense Ratio

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
C	2.029 (30.634)	1.801 (28.395)	2.049 (28.765)	1.904 (25.168)	1.961 (25.822)	1.594 (24.703)
ALPHA	-.034 (-6.883)	-.034 (-7.606)	-.051 (-10.368)	-.051 (-10.30)	-.052 (-10.60)	-.063 (-12.97)
SIZE						-.000 (-1.971)
LSIZE	-.133 (-10.667)	-.129 (-11.182)	-.117 (-10.343)	-.117 (-10.382)	-.100 (-8.443)	
12B-1		.903 (13.377)	.898 (13.640)	.881 (13.505)	.942 (14.282)	.983 (14.457)
EQINC			-.508 (-5.525)	-.460 (-5.034)	-.420 (-4.619)	-.463 (-4.933)
GRINC			-.440 (-6.753)	-.390 (-5.977)	-.407 (-6.297)	-.474 (-7.134)
GRTH			-.338 (-6.028)	-.323 (-5.796)	-.336 (-6.076)	-.385 (-6.780)
TURNOVER				.0016 (5.167)	.0017 (5.684)	.0018 (3.589)
LMGTCO					-.087 (-4.469)	-.133 (-7.103)
R^2	0.172	0.296	0.334	0.351	0.364	0.322
SE of Reg.	0.721	0.665	0.648	0.641	0.634	0.655

T-statistics in parentheses.

Table 2b

Composition of the Expense Ratio using Gross Risk-Adjusted Returns

(Sample of 1015 funds)

Dependent Variable: Expense Ratio

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
C	2.112 (31.758)	1.881 (29.420)	2.072 (27.383)	1.918 (23.954)	1.978 (24.537)	1.545 (21.753)
Q	-.009 (-1.724)	-.013 (-2.805)	-.026 (-4.865)	-.026 (-4.853)	-.027 (-5.169)	-.039 (-7.317)
SIZE						-.000 (-2.293)
LSIZE	-.150 (-11.92)	-.144 (-12.35)	-.137 (-11.82)	-.137 (-11.89)	-.120 (-9.904)	
12B-1		.912 (13.150)	.920 (13.400)	.901 (13.251)	.962 (13.962)	1.023 (14.263)
EQINC			-.364 (-3.784)	-.316 (-3.297)	-.280 (-2.939)	-.323 (-3.254)
GRINC			-.304 (-4.445)	-.253 (-3.696)	-.274 (-4.019)	-.347 (-4.903)
GRTH			-.229 (-3.887)	-.214 (-3.650)	-.229 (-3.932)	-.283 (-4.672)
TURNOVER				.0017 (5.359)	.0018 (5.841)	.0019 (5.836)
LMGTCO					-.085 (-4.281)	-.143 (-7.234)
R^2	0.136	0.262	0.279	0.299	0.316	0.248
SE of Reg.	0.737	0.681	0.674	0.666	0.660	0.690

T-statistics in parentheses.

Table 3a

Composition of the Expense Ratio
using Net Risk-Adjusted Returns
(Funds with $\alpha < 0$)

Dependent Variable: Expense Ratio

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**
C	1.852 (24.161)	1.628 (22.774)	1.829 (17.706)	1.793 (16.413)	1.842 (17.026)	1.496 (11.322)	2.145 (12.686)
ALPHASQ	-.009 (-25.155)	-.010 (-28.318)	-.010 (-28.450)	-.009 (-27.634)	-.009 (-28.026)		
ALPHA						-.207 (-20.305)	
LALPHA							-.156 (-4.409)
LSIZE	-.127 (-8.497)	-.124 (-9.240)	-.120 (-8.971)	-.122 (-8.997)	-.104 (-7.509)	-.096 (-5.725)	-.179 (-8.212)
12B-1		.872 (11.308)	.872 (11.361)	.867 (11.249)	.947 (12.096)	.909 (9.799)	.863 (7.033)
EQINC			-.271 (-2.418)	-.250 (-2.186)	-.197 (-1.739)	-.273 (-2.036)	-.183 (-1.030)
GRINC			-.245 (-2.615)	-.224 (-2.332)	-.222 (-2.354)	-.231 (-2.064)	-.137 (-.922)
GRTH			-.225 (-2.493)	-.213 (-2.341)	-.207 (-2.302)	-.264 (-2.475)	-.190 (-1.344)
TURNOVER				.0004 (1.024)	.0006 (1.736)	.0002 (.386)	.0021 (3.589)
LMGTCO					-.098 (-4.145)	-.085 (-3.022)	-.102 (-2.737)
R^2	0.628	0.702	0.706	0.707	0.716	0.601	0.303
SE of Reg.	0.619	0.554	0.552	0.553	0.544	0.645	0.853

T-statistics in parentheses.

Table 3b

Composition of the Expense Ratio
using Gross Risk-Adjusted Returns
(Funds with $\alpha > 0$)

Dependent Variable: Expense Ratio

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
C	1.622 (26.742)	1.384 (31.409)	1.431 (30.477)	1.363 (27.809)	1.409 (29.068)	1.390 (29.978)	1.436 (29.652)
ALPHASQ							.001 (3.197)
ALPHA						.016 (4.416)	
LALPHA	.075 (5.386)	.075 (7.706)	.061 (5.639)	.052 (4.775)	.049 (4.693)		
LSIZE	-.075 (-8.071)	-.070 (-9.467)	-.068 (-9.156)	-.066 (-8.966)	-.053 (-6.994)	-.054 (-7.107)	-.053 (-6.864)
12B-1		.985 (22.398)	.973 (22.242)	.962 (22.261)	.997 (23.424)	.982 (23.003)	.982 (22.774)
EQINC			-.097 (-1.267)	-.107 (-1.426)	-.048 (-.652)	-.060 (-.810)	-.105 (-1.429)
GRINC			-.152 (-3.485)	-.143 (-3.326)	-.158 (-3.771)	-.165 (-3.944)	-.200 (-4.924)
GRTH			-.055 (-1.766)	-.060 (-1.951)	-.072 (-2.415)	-.072 (-2.396)	-.097 (-3.297)
TURNOVER				.0008 (4.123)	.0009 (4.511)	.0009 (4.281)	.0009 (4.670)
LMGTCO					-.062 (-5.319)	-.059 (-4.972)	-.059 (-4.938)
R^2	0.136	0.572	0.582	0.595	0.617	0.616	0.608
SE of Reg.	0.419	0.296	0.293	0.288	0.281	0.281	0.284

T-statistics in parentheses.

Table 4a

Composition of the Expense Ratio
using Net Risk-Adjusted Returns
(Funds with $\alpha < 0$)

Dependent Variable: Expense Ratio

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
C	1.945 (22.322)	1.705 (20.537)	1.884 (15.616)	1.853 (14.538)	1.901 (14.990)	2.011 (12.943)	2.200 (13.173)
QSQ	-.018 (-19.190)	-.018 (-21.436)	-.018 (-21.437)	-.018 (-20.633)	-.018 (-20.804)		
Q						-.164 (-10.935)	
LQ							-.162 (-5.233)
LSIZE	-.143 (-8.437)	-.139 (-8.958)	-.137 (-8.756)	-.138 (-8.758)	-.121 (-7.432)	-.152 (-7.613)	-.180 (-8.400)
12B-1		.911 (10.155)	.910 (10.154)	.905 (10.049)	.983 (10.702)	1.050 (9.262)	.900 (7.394)
EQINC			-.247 (-1.890)	-.228 (-1.712)	-.176 (-1.327)	-.256 (-1.572)	-.139 (-.787)
GRINC			-.200 (-1.829)	-.181 (-1.616)	-.180 (-1.621)	-.213 (-1.564)	-.084 (-.574)
GRTH			-.205 (-1.945)	-.195 (-1.828)	-.188 (-1.785)	-.257 (-1.986)	-.145 (-1.037)
TURNOVER				.0003 (782)	.0006 (1.377)	.0011 (2.113)	.0023 (4.000)
LMGTCO					-.097 (-3.482)	-.106 (-3.128)	-.113 (-3.059)
R^2	0.516	0.597	0.601	0.601	0.610	0.415	0.314
SE of Reg.	0.706	0.645	0.644	0.645	0.638	0.782	0.846

T-statistics in parentheses.

Composition of the Expense Ratio using Gross Risk-Adjusted Returns

(Funds with $\alpha > 0$)

Dependent Variable: Expense Ratio

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
C	1.337 (20.573)	1.188 (25.290)	1.222 (22.803)	1.187 (21.923)	1.238 (23.050)	1.339 (26.620)	1.425 (29.553)
QSQ							.001 (4.237)
Q						.021 (6.196)	
LQ	.232 (10.117)	.181 (10.929)	.167 (8.900)	.151 (7.870)	.144 (7.680)		
LSIZE	-.070 (-7.048)	-.067 (-9.424)	-.066 (-9.288)	-.065 (-9.145)	-.053 (-7.208)	-.055 (-7.330)	-.053 (-7.013)
12B-1		.919 (21.777)	.917 (21.708)	.913 (21.785)	.948 (22.886)	.958 (22.709)	.973 (22.679)
EQINC			-.025 (-.336)	-.038 (-.512)	.014 (.192)	-.032 (-.440)	-.093 (-1.270)
GRINC			-.086 (-2.010)	-.083 (-1.962)	-.100 (-2.424)	-.138 (-3.353)	-.188 (-4.648)
GRTH			-.015 (-501)	-.021 (-.707)	-.035 (-1.190)	-.053 (-1.772)	-.087 (-2.973)
TURNOVER				.0007 (3.341)	.0007 (3.736)	.0008 (3.874)	.0008 (4.437)
LMGTCO					-.058 (-5.136)	-.055 (-4.762)	-.057 (-4.789)
R^2	0.242	0.614	0.617	0.624	0.643	0.630	0.615
SE of Reg.	0.393	0.281	0.280	0.278	0.271	0.276	0.282

T-statistics in parentheses.

Table 5a

Composition of the Expense Ratio
using Net Risk-Adjusted Returns

Dependent Variable: Expense Ratio

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
C	1.741 (35.097)	1.506 (34.653)	1.608 (31.038)	1.563 (28.747)	1.616 (29.831)
NEGALPHASQ	-.010 (-31.249)	-.010 (-36.084)	-.010 (-36.426)	-.010 (-35.711)	-.010 (-36.352)
POSLALPHA	.082 (4.892)	.085 (6.019)	.058 (3.742)	.054 (3.430)	.051 (3.301)
LSIZE	-.100 (-10.950)	-.096 (-12.398)	-.094 (-12.228)	-.094 (-12.226)	-.079 (-9.861)
12B-1		.922 (20.187)	.919 (20.228)	.911 (20.053)	.967 (21.191)
EQINC			-.169 (-2.691)	-.158 (-2.510)	-.120 (-1.925)
GRINC			-.167 (-3.761)	-.154 (-3.437)	-.168 (-3.815)
GRTH			-.108 (-2.795)	-.106 (-2.760)	-.117 (-3.074)
TURNOVER				.0006 (2.663)	.0007 (3.360)
LMGTCO					-.079 (-5.999)
R^2	0.548	0.678	0.683	0.685	0.696
SE of Reg.	0.533	0.450	0.447	0.446	0.439

T-statistics in parentheses.

Table 5b

Composition of the Expense Ratio using Gross Risk-Adjusted Returns

Dependent Variable: Expense Ratio

	Model 1	Model 2	Model 3	Model 4	Model 5
C	1.756 (32.119)	1.522 (30.876)	1.597 (25.887)	1.556 (24.147)	1.609 (24.965)
NEGQSQ	-.019 (-24.542)	-.019 (-28.670)	-.019 (-28.665)	-.019 (-27.856)	-.019 (-28.207)
POSLQ	.128 (5.919)	.115 (6.116)	.090 (4.021)	.086 (3.817)	.082 (3.697)
LSIZE	-.113 (-11.280)	-.108 (-12.303)	-.106 (-12.049)	-.106 (-12.039)	-.091 (-9.902)
12B-1		.929 (18.050)	.930 (18.079)	.923 (17.912)	.978 (18.809)
EQINC			-.118 (-1.597)	-.107 (-1.444)	-.071 (-.963)
GRINC			-.104 (-1.943)	-.090 (-1.683)	-.106 (-1.987)
GRTH			-.076 (-1.680)	-.074 (-1.629)	-.084 (-1.887)
TURNOVER				.0005 (2.243)	.0007 (2.828)
LMGTCO					-.077 (-5.157)
R^2	0.461	0.593	0.595	0.596	0.607
SE of Reg.	0.582	0.506	0.506	0.507	0.499

T-statistics in parentheses.

Load Structure and 12b-1 Plans

Table 6a

	Deferred Load		Front Load		No Load	
Objective	**12b-1**	**No 12b-1**	**12b-1**	**No 12b-1**	**12b-1**	**No 12b-1**
Aggressive Growth	11	0	17	6	6	16
Equity Income	9	0	26	7	3	27
Growth	53	1	137	55	41	175
Growth & Income	24	0	72	20	31	95
Small Company	16	0	45	11	26	85
	113	1	297	99	107	398

Table 6b

	Deferred Load		Front Load		No Load	
Objective	**12b-1**	**No 12b-1**	**12b-1**	**No 12b-1**	**12b-1**	**No 12b-1**
Aggressive Growth	100.0%	0.0%	73.9%	26.1%	27.3%	72.7%
Equity Income	100.0	0.0	78.8	21.2	10.0	90.0
Growth	98.1	1.9	71.3	28.7	19.0	81.0
Growth & Income	100.0	0.0	78.3	21.7	24.6	75.4
Small Company	100.0	0.0	80.4	19.6	23.4	76.6
	99.1	0.9	75.0	25.0	21.2	78.8

Table 6c

	Deferred Load		Front Load		No Load	
Objective	**12b-1**	**No 12b-1**	**12b-1**	**No 12b-1**	**12b-1**	**No 12b-1**
Aggressive Growth	9.7%	0.0%	5.7%	6.1%	5.6%	4.0%
Equity Income	8.0	0.0	8.8	7.1	2.8	6.8
Growth	46.9	100.0	46.1	55.5	38.3	44.0
Growth & Income	21.2	0.0	24.2	20.2	29.0	23.9
Small Company	14.1	0.0	15.2	11.1	24.3	21.3
Mean 12b-1 Fee	0.925		0.300		0.360	