ECONOMIES OF SCALE IN MUTUAL FUND ADMINISTRATION*

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Abstract

Since many mutual fund expenses are fixed costs, asset growth should reduce the ratio of fund expenses to average net assets. A translog cost function is estimated for a sample of 2,610 funds to evaluate the existence and extent of scale economies in mutual fund administration. The elasticity of fund expenses with respect to fund assets is significantly less than one, indicating there are scale economies in mutual fund administration. Average costs diminish over the full range of fund assets; however, the really rapid decrease in average costs is exhausted by about $3.5 billion in fund assets.

I. Introduction

Are there economies of scale in administering and managing mutual funds? Since many mutual fund expenses are fixed costs, asset growth should reduce the ratio of fund expenses to average net assets, the fund's average cost. Although there potentially are enormous economies of scale in managing money, the annual expense ratio of the average domestic common stock mutual fund rose from 0.70 percent of assets in 1961 to 1.50 percent in 1992, despite a twenty-fold increase in equity fund assets over the period (Bogle (1994)). Mack (1993) lists three factors that contributed to the rise in the mutual fund industry expense ratio: (1), the adoption of Rule 12b-1 in 1980 that allows funds to finance distribution expenses out of fund assets; (2), the expansion of costly computer, telephone, and shareholder accounting systems; and (3), the rise in the number of small and international funds.

Indeed, the total number of mutual funds rose from 1,038 in January 1984 to 6,235 in December 1996 (Fortune (1997)), and the variance in asset size among funds has surely increased.[1] I take advantage of this increase in the number and variety of mutual funds to examine whether there is evidence of scale economies in fund administration across a large cross-section of debt and equity open-end investment companies.

II. Mutual Fund Expenses

All mutual funds have operating expenses. Three major categories of mutual fund expenses are paid out of fund assets. The first and typically largest is the management fee paid

[1] The numbers include bond, equity, and money market funds. As of August 31, 1997, there were 5,856 open-end stock and bond funds listed on NASDAQ. Malhotra and McLeod (1997) report that the standard deviation of total fund assets increased between 1992 and 1993 among both stock and bond funds.

to the fund's investment advisor. Second are the "other" administrative expenses resulting from the provision of recordkeeping and transactions services to shareholders. These services include providing statements and reports, disbursing dividends, providing custodial services, and paying state and local taxes, auditing, legal, and directors' fees. Third is the 12b-1 distribution fee spent on advertising, marketing, and distribution services or on commissions to sales representatives.

The investment advisory fee compensates the fund's manager for the expenses it incurs for providing its services, including security research and analysis. The advisor's profit also comes out of the management fee. It seems improbable these costs could grow at the same rate as fund assets. It might be more difficult to manage a large portfolio than a small one, but it does not seem likely that it would cost twice as much to manage a $100 million fund than a $50 million portfolio.

The purpose of 12b-1 fees is to increase fund assets. 12b-1 fees are effectively capped at 1 percent. By attracting investors into the fund, 12b-1 fees make scale economies possible, but the fees themselves only add to a fund's expenses.[2]

It is the other administrative expenses that are subject to enormous economies of scale. The cost of maintaining shareholder accounts is the same for all shareholders, regardless of the size of their account. Suppose the annual cost of maintaining an account is $40 and that the mutual fund has 100,000 shareholders. If the fund has $100,000,000 in assets (an average of $1,000 per account), then the other administrative expenses are 4.0 percent of fund assets. But,

[2] Ferris and Chance (1987), Chance and Ferris (1991), McLeod and Malhotra (1994), and Malhotra and McLeod (1997) all find that 12b-1 plans raise expense ratios. However, the average expense ratio for domestic stock funds rose even for funds with 12b-1 fees less than 0.5 percent: from 1.09 in 1984 to 1.2 in 1993 (Schiffres (1994)). So, 12b-1 fees cannot be the only reason why the average expense ratio has risen.

if total assets are $250,000,000 (an average account of $2,500), then the other administrative expense ratio is 1.6 percent. The expense ratio falls as fund assets rise.

III. Model Specification

The cost function of a mutual fund is modeled as a translog function.[3] The advantage of the translog cost function is that it allows scale economies to vary with the level of fund assets. The translog cost function takes the form

$$\ln COST = \alpha_0 + \alpha_1 \ln ASSETS + 1/2\ \alpha_2 (\ln ASSETS)^2 + \Sigma_j\ \alpha_j\ X_j + e \qquad (1)$$

where COST is the fund's total operating expenses, ASSETS equals total fund assets, X_j is a vector of fund characteristics that may affect costs, and e is a random error term. The vector X_j is included to control for factors that affect the costs of managing and administering a mutual fund. These control variables are the average expense ratio for funds with the same investment objective as the fund in question, the fund's annualized five-year return in percentage terms, the fund's front-end sales load, the fund's back-end load, and the total amount of mutual fund assets managed by the family complex to which the fund belongs.

If there are economies of scale in mutual fund administration, there should be a negative relation between the expense ratio and fund assets. Ferris and Chance (1987), McLeod and Malhotra (1994), and Malhotra and McLeod (1997) all find a negative relationship between fund size and the expense ratio. However, they each consider only two categories of funds, utilizing dummy variables for growth and income funds or for equity and bond funds. Yet, even within

[3] The translog function is often used in economies of scale research. Some examples: banks (Noulas, Ray, and Miller (1990)), real estate investment trusts (Bers and Springer (1998)), electrical power generation (Christensen and Greene (1976)), and police departments (Gyimah-Brempong (1987)).

these broad classifications persistent patterns of differences appear in expense ratios. Some types of funds are just more costly to manage. Global and international funds, for example, tend to have higher expense ratios than growth and equity income funds. I add the fund objective average expense ratio to the right-hand side regressors to control for the inherent differences in fund expenses due to differing investment objectives.

A fund's average annual return influences the size of the management fee paid to its investment advisors. Fund managers are rewarded for performance. Managers posting high returns will be able to command a higher fee than managers of funds with low returns.

A fund's sales representative may be compensated by a sales load on the investor who purchased the shares or out of fund assets, a 12b-1 fee paid by all shareholders. A fund with a front-end or back-end load need not charge as high a 12b-1 fee. So, I expect a negative relationship between the expense ratio and the two load variables. However, the relationship between front and back-end loads and the expense ratio is complex. In Hooks' (1996) sample of 1,012 equity funds, load funds actually have a higher average annual expense ratio than no-load funds. Some funds have issued several series of shares. Kemper Growth Fund Class A shares, as a typical example, have a front-end load of 5.75 percent with an expense ratio of 1.07 percent. The Class B shares have a back-end redemption fee of 4 percent, but the expense ratio is 2.05 percent. Class C shares, available to Kemper employees, have a redemption fee of 1 percent and an expense ratio of 1.95. Keystone Strategic Income Fund Class C shares, on the other hand, have a lower back-end load but the same expense ratio as the Class B shares.

Funds in the same family tend to share expenses such as computer, telephone, and shareholder accounting systems. Therefore, funds that are part of a mutual fund family may obtain greater economies of scale than can be explained solely by fund size. The greater the

amount of assets managed by a fund complex, the greater the possible scale economies and consequent reduction in the expense ratios of family members.

IV. Data and Sources

Information on mutual funds was obtained from the October 6, 1997 *Barron's Lipper Mutual Funds Quarterly*. It lists 5,856 open-end stock and bond funds. Since my interest is in the effect of asset size on mutual fund expenses, the sample is restricted to those funds that have been in existence for at least five years in order because the expenses of new funds are often subsidized by their sponsor and to keep the sample a manageable size. This leaves a sample of 2,610 funds.

Barron's has forty-three different investment objectives for debt and equity funds and seven types of municipal bond funds.[4] I place all municipal bond funds in a single category. Since several of the debt and equity investment objective categories contain very few funds, I collapse several categories into groups containing funds with similar investment objectives: "balanced" consists of balanced, balanced target, and income funds, "global" consists of global, global flexible, and global small-cap funds, "international" consists of international, international small-cap, Canadian, emerging regions, European region, and Latin American funds, "Pacific" consists of Pacific region, Pacific Ex-Japan, Japanese, and China region funds, "specialty" consists of specialty, telecommunications, environmental, financial services, health/biotech, and science and technology funds.

[Table 1 about here}

[4] See page F32 of the October 6, 1997 *Barron's Lipper Mutual Funds Quarterly* for a description of the different investment objectives.

Table 1 lists the number of funds in each of the twenty-two investment objective categories along with average fund assets and the arithmetic average expense ratio. Fund assets are as of August 31, 1997. The family assets variable is the sum of assets of all funds in the family complex to which a mutual fund belongs. The other variables are as of September 30, 1997. The front and back-end load variables take a value of zero for no-load funds and the size of the load in percentage terms for load funds.

V. Results

[Table 2 about here]

The estimated coefficients of the translog function are reported in Table 2. All coefficients are statistically significant. The fund asset coefficient is positive, implying a positive cost elasticity. The elasticity of cost with respect to assets, the percentage change in cost associated with a percentage change in fund assets, can be used to evaluate the existence and extent of scale economies in mutual fund administration. This elasticity is calculated by taking the first derivative of the translog cost function in equation (1):

$$\partial (\ln \text{COST}) / \partial (\ln \text{ASSETS}) = \alpha_1 + \alpha_2 (\ln \text{ASSETS}) \qquad (2)$$

If the cost elasticity is less than one, mutual fund expenses increase less than proportionately with fund assets, implying economies of scale. If the elasticity is greater than one, diseconomies of scale exist, and if the cost elasticity equals one, there are constant returns to scale as fund costs increase proportionately with assets.

One approach to evaluating the existence of scale economies using the cost elasticity is the “average” method (Noulas, Ray, and Miller (1990)). The average method estimates the cost

elasticity for each observation and averages across observations to obtain the group average elasticity. Table 3 presents estimates of average cost elasticity at different data points to

[Table 3 about here]

determine how changes in fund size affect cost. All categories of fund size, each containing an equal number of funds, exhibit economies of scale on average. All estimated cost elasticities are less than one and statistically significant. The magnitude of scale economies varies only a little across asset size.

[Table 4 about here]

Table 4 presents estimates of average cost elasticity for the different investment objectives. All cost elasticities except those for convertible securities, micro cap, and S&P index funds are significantly less than one at the .01 level, implying that economies of scale exist in the administration of nearly all types of equity and bond mutual funds.

[Figure I about here]

The economies of scale in the mutual fund industry can be summarized by computing the average cost curve facing the typical mutual fund. This is derived by calculating the predicted average costs from the predicted total costs of equation (1) for various fund asset sizes, holding the control variables constant at their mean values. Figure I plots the average cost curve for a typical mutual fund. Average costs diminish over the full range of fund assets; however, the rapid decrease in average costs is exhausted by about $3.5 billion in fund assets, a size reached by just 124 funds in the sample.

VI. Conclusions

Since many mutual fund expenses are fixed costs, asset growth should reduce the ratio of fund expenses to average net assets. Utilizing a cross-section sample of 2,610 mutual funds and controlling for twenty-two different investment objectives, a translog cost function is estimated to evaluate the existence and extent of economies of scale in mutual fund administration. The elasticity of fund costs with respect to fund assets is significantly less than one for all categories of fund size. The average cost curve of a typical mutual fund is downward sloping over the entire range of fund assets. There are scale economies in administering mutual funds.

Table 1. Data Summary

Investment objective	Number of funds	Average assets (millions of dollars)	Average expense ratio
capital appreciation	69	1106.9	1.81
global	67	1413.0	1.73
gold	26	132.8	1.64
Pacific region	29	324.9	1.61
specialty	67	631.4	1.57
natural resources	17	363.5	1.54
international	130	1057.9	1.49
convertible securities	18	280.1	1.48
flexible	50	846.6	1.44
world income	70	199.3	1.38
real estate	6	900.8	1.37
growth	280	1556.4	1.30
micro cap	7	281.9	1.30
small-cap growth	117	681.9	1.27
utility	28	449.5	1.27
midcap	60	991.4	1.23
equity income	59	1828.5	1.21
growth income	209	1904.3	1.10
balanced	106	1090.5	1.09
fixed income	572	497.8	0.97
municipal bonds	602	373.9	0.88
S&P index	21	3808.8	0.38
full sample	2610	857.3	1.15

Table 2. Regression Results for Full Sample (Dependent Variable = Natural Log of Total Fund Expenses)

Number of observations	2610
Adjusted R^2	0.95
Standard error	0.35
Constant	-2.191
	(3.282)
Log of fund assets	0.713
	(10.317)
Log of fund assets squared	0.005
	(2.917)
Fund objective average expense ratio	0.832
	(27.914)
Five-year return	0.004
	(3.196)
Front-end load	0.046
	(14.836)
Redemption fee	0.162
	(32.100)
Family assets	-0.000
	(7.259)

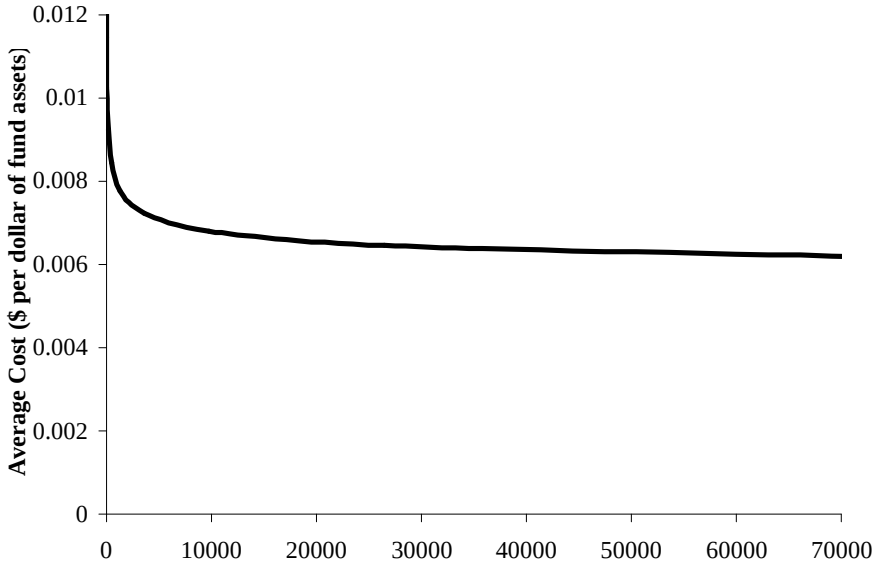
Table 3. Average Elasticities by Fund Size

Fund size (millions of $)	Cost elasticity	Standard deviation of elasticity
0 to 50.0	0.93	.08
50.0 to 121.5	0.84	.06
121.5 to 287.8	0.92	.08
287.8 to 795.9	0.94	.09
795.9 and higher	0.90	.01
All funds	0.91	.02

Table 4. Average Elasticities by Fund Objective

Investment objective	Cost elasticity	Standard deviation of cost elasticity
capital appreciation	0.90	.08
global	0.88	.02
gold	0.72	.21
Pacific region	0.85	.06
specialty	0.86	.01
natural resources	0.74	.21
international	0.93	.03
convertible securities	0.98	.14
flexible	0.88	.01
world income	0.96	.03
growth	0.93	.11
micro cap	0.63	.50
small-cap growth	0.97	.02
utility	0.90	.02
midcap	0.99	.01
equity income	0.86	.10
growth income	0.92	.04
balanced	0.92	.03
fixed income	0.92	.01
municipal bonds	0.96	.04
S&P index	1.00	.06

Figure I: Mutual Fund Average Cost Curve



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