Mutual Fund Economies of Scale: A Longitudinal Study, 1993-2011

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ABSTRACT

Since some mutual fund expenses are fixed costs, asset growth ought to reduce the fund’s expense ratio. As affirmed by Jones v. Harris Associates, economies of scale is a factor considered by courts in evaluating the reasonableness of mutual fund fees. Using a longitudinal data set containing 30,757 observations on 2,610 funds and estimating a cost function with the log difference of fund expenses as the dependent variable, I find that elasticity of the change in fund costs with respect to the change in assets is less than one, implying the existence of scale economies for the average mutual fund.

INTRODUCTION

Understanding mutual funds as an industry requires an understanding of the costs of operating a mutual fund. First of all, the amounts involved are large. Mutual fund operators annually collect over $80 billion in fees from fund shareholders. Second, costs are related to the structure of the mutual fund industry, encouraging fund mergers (Jayaraman, Khorana, and Nelling 2002) and the formation of fund families (Baumol, Goldfeld, Gordon, and Koehn 1990; Collins and Mack 1997). Third, although investors pay little attention to fund expenses (Barber, Odean, and Zheng 2005) these costs are associated with fund performance. Studies relating costs and performance find that high-cost mutual funds underperform low-cost funds (Malkiel 1995; Gruber 1996; Carhart 1997). And fourth, mutual fund fees have come under legal scrutiny in recent years. In 2010, in the case of Jones v. Harris Associates, the U.S. Supreme Court held that courts have the jurisdiction to regulate mutual fund fees when those fees are excessive. The lead up to this decision sparked an extensive debate on market competition, government regulation, and the appropriate level of mutual fund fees (Coates and Hubbard 2007; Freeman, Brown, and Pomerantz 2008; Johnson 2008; Leist 2009; Davis 2010; Johnsen 2010; Morley and Curtis 2010; Ribstein 2010; Yeung and Freeman 2010).

All mutual funds incur ongoing management and administrative expenses, which are deducted from the fund’s assets. Since some of these expenses are fixed costs there potentially are economies of scale in managing a mutual fund. Three major categories of mutual fund expenses are paid out of fund assets, the investment advisory or management fee, distribution fees, and administrative costs. The largest cost category is the investment advisory fee. This fee compensates the fund’s manager for the expenses it incurs for providing its services, including security research and analysis. The adviser’s profit also comes out of the management fee. The investment advisory fee is a fixed percentage amount deducted from fund assets over the year,
although some funds have performance-related management fees. Some small scale economies are possible here because while it may be more difficult to manage a large fund compared to a small fund it is unlikely that management costs rise in the same proportion as assets. Some funds recognize this by having breakpoints where management fees are reduced as assets cross certain levels.

Distribution fees are intended to increase fund assets. These fees are a fixed percentage of fund assets. The Toqueville Trust (2012, p. 39), for example, has a distribution agreement which states that “(t)he Plans provide that a Fund pays Rule 12b-1 distribution and service fees of 0.25% per annum of such Fund’s average daily net assets. The Plans compensate the Distributor regardless of expenses actually incurred by the Distributor.” Consequently, by attracting investors into the fund distribution fees make scale economies possible but the fees themselves, being a fixed percentage of assets, exhibit constant returns.

It is the administrative expenses resulting from the provision of record keeping and transactions services to shareholders that are likely the major source of economies of scale. These administrative costs are a mix of fixed costs (auditing, registration, legal, and directors’ fees) and variable costs (maintaining shareholder accounts, providing statements and reports, disburse dividend services). When fund asset growth comes primarily from portfolio appreciation, the variable administrative costs will rise only a little, meaning that the ratio of administrative costs to fund assets will fall as assets rise.

Indeed, some industry practices are premised on the existence of such scale economies in which asset growth reduces the fund’s expense ratio. Consider 12b-1 or distribution fees. Distribution payments allow mutual funds to pay for marketing expenses directly out of fund assets. Distribution fees are used to finance activities intended to result in the sale of fund shares. For example, in fiscal year 2011, shareholders of the Toqueville Fund paid distribution fees in the amount of $1,292,138 (Toqueville Trust, 2012, p. 39). $32,144 was spent on advertising, $3,078 was used to pay for printing and mailing prospectuses to prospective shareholders, $265,433 was paid to compensate underwriters, and $1,035,904 was spent on compensation to broker-dealers. Essentially, distribution fees require existing shareholders to pay for efforts to attract additional shareholders because these costs “are intended to benefit the Funds, among other things, by supporting the Funds’ distribution, which may increase their assets and reduce their expense ratios” (Toqueville Trust, 2012, p. 39). Shareholders benefit from 12b-1 fees if the economies of scale in operating a mutual fund are sufficiently strong to offset the fees.

Mutual fund sponsors also appeal to economies of scale to justify fund mergers. For instance, Delaware Investments merged its Large Cap Value Fund into the Delaware Value Fund in 2012. “In a letter to shareholders, Patrick Coyne, CEO, said that the reorganization would allow both funds’ shareholders to benefit from exposure to a larger pool of assets . . .” (Jardine, 2012). Again, such an assertion assumes the existence of economies of scale.

The existence of economies of scale in managing a mutual fund was assumed by the Second Circuit Court of Appeals in 1982 in Gartenberg v. Merrill Lynch Asset Management
(694 F. 2d 928), where the court held that to violate the law under the Investment Company Act of 1940 “the adviser-manager must charge a fee that is so disproportionately large that it bears no reasonable relationship to the services rendered and could not have been the product of arm’s-length bargaining.” Gartenberg created a six-factor analysis for fee reasonableness, one of which is economies of scale (Morley and Curtis, 2010, p. 97). In Jones v. Harris Associates the Supreme Court adopted the standard for liability for excessive mutual fund fees set forth in the Gartenberg decision.

Academics, as well, have long assumed the existence of economies of scale in managing mutual funds (Wharton School of Finance and Commerce, 1962, p. 29). Many researchers have investigated the existence of scale economies in the administration of mutual funds in the United States. Some examine simple or weighted average expense ratios within ranges of fund assets (Rea, Reid, and Millar 1999; Freeman and Brown 2001; Collins and Gallagher 2012). Others regress total expenses or, more problematically, the expense ratio on fund assets and other variables for a cross-section of funds using annual (McLeod and Malhotra 1994; Malhotra and McLeod 1997; Latzko 1999; Securities and Exchange Commission 2000; Zera and Tsay 2007; Banko, Beyer, and Dowen 2010) or pooled data (LaPlante 2001; Zera and Madura 2001; Dowen and Mann 2004). These studies all compare the level of fund expenses to the level of fund assets and conclude that economies of scale exist because larger funds tend to operate at a lower expense ratio than smaller funds. But, for legal and policy purposes what matters is the relationship between changes in fund expenses and changes in fund assets over time. Economies of scale exist if an increase in fund assets results in a less than proportional increase in fund expenses. To address this question I investigate the elasticity of the change in fund costs with respect to the change in assets by utilizing a longitudinal data set containing up to 19 annual observations on a cross-section of mutual funds. The panel data has the advantage that it utilizes information on both the inter-temporal dynamics and the individuality of the funds being investigated.

**MODEL SPECIFICATION**

Rather than the levels of fund costs and assets, I use the percentage changes in fund costs and in assets as variables and model the cost function of a mutual fund as

\[
(\ln \text{COST}_{it} - \ln \text{COST}_{it-1}) = \phi_i + \psi_t + \alpha (\ln \text{ASSETS}_{it} - \ln \text{ASSETS}_{it-1}) + e_{it},
\]

where \(\text{COST}_{it}\) is fund i’s operating expenses in year t, \(\text{ASSETS}_{it}\) equals total net assets in year t for fund i, \(\phi_i\) and \(\psi_t\) are fund fixed effects and year effects, and \(e_{it}\) is a random error term. The year effects variable is supposed to account for any industry-wide factors affecting the costs of operating mutual funds such as regulatory changes, and the fund fixed effects term is included to control for factors constant over time that affect the costs of managing and administering a mutual fund independent of the size of the fund such as its investment objective and its load/no load status. Some types of funds are just more costly to manage. Bond funds tend to have lower management costs than similar-sized equity funds while global and international funds often have higher custodial, management, and transactions costs and, therefore, tend to have higher total expenses than domestic equity and fixed income funds with the same amount of assets.
under management. A fund’s sales representative may be compensated by a sales load on the investor who purchased the shares or out of fund assets, through 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. However, the relationship between front and back-end loads and the expense ratio is potentially complex. Investors purchasing a load fund through a broker may not be as cost sensitive as no-load investors, allowing load fund operators to charge high management and distribution fees. In Hooks’ (1996) sample of 1,012 equity funds, load funds actually have a higher average annual expense ratio than no-load funds.

**DATA AND SOURCES**

The data set consists of the 2,610 U.S. mutual funds that had been in existence for at least five years as of 1997. Cost and data was collected for the years 1993 through 2011. Due to fund liquidations and mergers, the sample drops to 1,017 funds in 2011. Funds are sampled as of the end of their fiscal year.

Total mutual fund expenses include the management and administrative costs included in the fund’s expense ratio. Fund asset and cost data was hand-collected from documents filed on EDGAR with the SEC: form NSAR-B, the annual report for registered investment companies, the statement of operations and footnotes in forms N-30D and N-CSR, the annual report to shareholders, and the fund’s prospectus and accompanying statement of additional information, forms 485APOS and 485BPOS. For observations on a fund with multiple share classes, all expenses (other than class-specific expenses) are, following the industry practice, allocated to the class of shares being sampled based upon the relative value of the shares of that class. Class-specific expenses, which include distribution and service fees and any other items that are specifically attributable to a particular class, are charged directly to the class of shares being sampled. The filings prior to 1997 are incomplete for some funds.

Table 1 reports summary statistics on the sample of funds. Total net assets are the monthly average net assets reported on form NSAR-B. Average total net assets over all 33,404 observations are $1,376.5 million. Median assets are $228 million. The largest fund has net assets of $185,909 million; the smallest fund has just $10,000 in assets. The average expense ratio over all observations is 1.17. The median is 1.02. The highest annual expense ratio among sampled funds is 240.0 while the lowest is 0.02.
The table reports annual cross-sectional averages or median from 1993 to 2011. TNA is total net assets in millions of dollars. Expense ratio is total fund operating expenses divided by total net assets.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Number</th>
<th>Average TNA</th>
<th>Median TNA</th>
<th>Average Expense Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>1,372</td>
<td>$424.4</td>
<td>$127.6</td>
<td>1.13</td>
</tr>
<tr>
<td>1994</td>
<td>2,040</td>
<td>493.5</td>
<td>147.2</td>
<td>1.17</td>
</tr>
<tr>
<td>1995</td>
<td>2,407</td>
<td>543.9</td>
<td>151.0</td>
<td>1.21</td>
</tr>
<tr>
<td>1996</td>
<td>2,458</td>
<td>662.5</td>
<td>164.8</td>
<td>1.21</td>
</tr>
<tr>
<td>1997</td>
<td>2,610</td>
<td>829.3</td>
<td>178.2</td>
<td>1.20</td>
</tr>
<tr>
<td>1998</td>
<td>2,311</td>
<td>1,021.0</td>
<td>204.8</td>
<td>1.17</td>
</tr>
<tr>
<td>1999</td>
<td>2,186</td>
<td>1,223.6</td>
<td>221.1</td>
<td>1.17</td>
</tr>
<tr>
<td>2000</td>
<td>2,077</td>
<td>1,413.3</td>
<td>229.6</td>
<td>1.18</td>
</tr>
<tr>
<td>2001</td>
<td>1,946</td>
<td>1,356.2</td>
<td>240.6</td>
<td>1.20</td>
</tr>
<tr>
<td>2002</td>
<td>1,822</td>
<td>1,302.8</td>
<td>249.5</td>
<td>1.18</td>
</tr>
<tr>
<td>2003</td>
<td>1,711</td>
<td>1,354.8</td>
<td>284.1</td>
<td>1.21</td>
</tr>
<tr>
<td>2004</td>
<td>1,646</td>
<td>1,645.1</td>
<td>313.8</td>
<td>1.16</td>
</tr>
<tr>
<td>2005</td>
<td>1,552</td>
<td>1,897.6</td>
<td>342.0</td>
<td>1.15</td>
</tr>
<tr>
<td>2006</td>
<td>1,419</td>
<td>2,267.8</td>
<td>375.2</td>
<td>1.21</td>
</tr>
<tr>
<td>2007</td>
<td>1,311</td>
<td>2,733.2</td>
<td>421.5</td>
<td>1.26</td>
</tr>
<tr>
<td>2008</td>
<td>1,245</td>
<td>2,455.7</td>
<td>369.8</td>
<td>1.08</td>
</tr>
<tr>
<td>2009</td>
<td>1,172</td>
<td>2,213.6</td>
<td>353.3</td>
<td>1.10</td>
</tr>
<tr>
<td>2010</td>
<td>1,102</td>
<td>2,268.7</td>
<td>319.8</td>
<td>1.05</td>
</tr>
<tr>
<td>2011</td>
<td>1,017</td>
<td>2,935.1</td>
<td>471.1</td>
<td>1.03</td>
</tr>
</tbody>
</table>

**RESULTS**

The cost function in equation (1) is estimated assuming a fixed effects model. The estimated coefficient for the log difference of fund assets is reported in Table 2. All coefficients, except that of the unreported 1994 year effects variable, are significant at the 0.05 level, and the adjusted R-squared is fairly high. The fund asset coefficient is positive, meaning that costs rise with assets. Because changes in the natural logarithm are (almost) equal to percentage changes in the original variables, the coefficient on the first difference of the log of
The second column reports the coefficients from a panel regression of the first difference of the log of total fund expenses on the first difference of the log of fund assets. The panel regression includes fund fixed effects and time effects. t-statistics are in parentheses.

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Coefficient</th>
<th>t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>First difference of log of fund assets</td>
<td>0.8605</td>
<td>(304.75)</td>
</tr>
<tr>
<td>Observations</td>
<td>30,757</td>
<td></td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>Standard error of regression</td>
<td>0.18</td>
<td></td>
</tr>
</tbody>
</table>

The elasticity of cost with respect to assets, 0.86, tells us the percentage change in fund costs resulting from a one percent change in fund assets. Fund costs increase less than proportionately with fund assets.

I use the elasticity of cost with respect to assets, the percentage change in cost associated with a percentage change in fund assets, to evaluate the existence and extent of scale economies in mutual fund administration. This elasticity is simply equal to the coefficient on the first difference of the log of fund assets variable in the cost function in equation (1), $\alpha$. 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. Table 3 presents estimates of average cost elasticity at different data points to determine how fund size affects cost. For the full sample of funds the average cost elasticity is 0.86. This means that a 10 percent increase in the assets of the average fund results in an additional 8.6 percent in fund expenses. The median fund in the sample in 2011 had $471 million in assets. A 10 percent increase in the fund’s assets would be expected to reduce its expense ratio from 1.03 to 1.02. With the typical mutual fund having a cost elasticity less than one, the U.S. mutual fund industry as a whole does experience cost economies of scale with respect to fund assets.

I sorted the sample into quintiles based on total net assets and estimated the cost function separately for the different fund-size groupings. Table 3 presents the estimated cost elasticities. The estimated cost elasticities for all categories of fund size are significantly different less than one at the 0.01 level, implying that all U.S. mutual funds experience economies of scale. The magnitude of scale economies varies across asset size, increasing for the first $150 million in fund assets and falling as fund assets continue to grow.
Cost elasticities are equal to $\alpha$, where $\alpha$ is the coefficient on the first difference of the log of fund assets from the panel estimates of the total operating expenses cost functions. The cost function is estimated separately for each group of funds. 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.

<table>
<thead>
<tr>
<th>Fund Size (millions of dollars)</th>
<th>Cost Elasticity</th>
<th>t-statistic</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 59.1</td>
<td>0.857</td>
<td>130.36</td>
<td>6,152</td>
</tr>
<tr>
<td>59.1 - 153.0</td>
<td>0.839</td>
<td>109.15</td>
<td>6,151</td>
</tr>
<tr>
<td>153.0 - 380.0</td>
<td>0.891</td>
<td>134.90</td>
<td>6,151</td>
</tr>
<tr>
<td>380.0 - 1,129.8</td>
<td>0.895</td>
<td>123.75</td>
<td>6,151</td>
</tr>
<tr>
<td>1,1129.8 - 185,909.2</td>
<td>0.898</td>
<td>110.42</td>
<td>6,152</td>
</tr>
<tr>
<td>All funds</td>
<td>0.860</td>
<td>304.75</td>
<td>30,757</td>
</tr>
</tbody>
</table>

I also estimated equation (1) separately for each fund investment objective. Fund investment objective information comes from the October 6, 1997 edition of Barron’s Lipper Mutual Funds Quarterly. Barron’s lists over forty different investment objectives for debt and equity funds and seven types of municipal bond funds. 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, and Pacific Ex-Japan, Japanese, and China region funds, and “specialty” consists of specialty, science and technology, telecommunications, environmental, real estate, financial services, and health/biotech funds.

Table 4 presents estimates of average cost elasticity for the different investment objectives. Equation (1) is estimated separately for each investment objective. All cost elasticities are significantly less than one at the .01 level, implying that economies of scale exist in the administration of all types of equity and bond mutual funds. The degree of scale economies is rather modest for most investment categories, with the more conservative investment categories, having cost elasticities closer to one. The largest scale economies are exhibited by Pacific region equity funds, which have a cost elasticity equal to 0.66.
Table 4
Average Cost Elasticities by Fund Objective

The cost function in equation (1) is estimated separately for each investment objective. Cost elasticities are determined are equal to the estimated coefficient of the first difference of the log of fund assets variable. An elasticity below 1.0 indicates economies of scale.

<table>
<thead>
<tr>
<th>Investment Objective</th>
<th>Cost Elasticity</th>
<th>t-statistic</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>balanced</td>
<td>0.79</td>
<td>44.83</td>
<td>1,189</td>
</tr>
<tr>
<td>capital appreciation</td>
<td>0.92</td>
<td>45.24</td>
<td>823</td>
</tr>
<tr>
<td>convertible securities</td>
<td>0.93</td>
<td>43.20</td>
<td>230</td>
</tr>
<tr>
<td>equity income</td>
<td>0.82</td>
<td>52.86</td>
<td>741</td>
</tr>
<tr>
<td>fixed income</td>
<td>0.90</td>
<td>139.30</td>
<td>6,146</td>
</tr>
<tr>
<td>flexible</td>
<td>0.78</td>
<td>24.63</td>
<td>538</td>
</tr>
<tr>
<td>global</td>
<td>0.88</td>
<td>66.75</td>
<td>788</td>
</tr>
<tr>
<td>gold</td>
<td>0.83</td>
<td>33.76</td>
<td>283</td>
</tr>
<tr>
<td>growth</td>
<td>0.90</td>
<td>78.51</td>
<td>3,173</td>
</tr>
<tr>
<td>growth income</td>
<td>0.82</td>
<td>68.59</td>
<td>2,408</td>
</tr>
<tr>
<td>international</td>
<td>0.79</td>
<td>64.22</td>
<td>1,560</td>
</tr>
<tr>
<td>micro cap</td>
<td>0.79</td>
<td>7.73</td>
<td>82</td>
</tr>
<tr>
<td>midcap</td>
<td>0.78</td>
<td>37.24</td>
<td>706</td>
</tr>
<tr>
<td>municipal bonds</td>
<td>0.92</td>
<td>138.37</td>
<td>7,709</td>
</tr>
<tr>
<td>natural resources</td>
<td>0.78</td>
<td>35.09</td>
<td>243</td>
</tr>
<tr>
<td>Pacific</td>
<td>0.66</td>
<td>23.15</td>
<td>345</td>
</tr>
<tr>
<td>S&amp;P index</td>
<td>0.90</td>
<td>27.18</td>
<td>284</td>
</tr>
<tr>
<td>small cap growth</td>
<td>0.92</td>
<td>104.23</td>
<td>1,516</td>
</tr>
<tr>
<td>specialty</td>
<td>0.87</td>
<td>105.06</td>
<td>1,012</td>
</tr>
<tr>
<td>utility</td>
<td>0.89</td>
<td>14.43</td>
<td>344</td>
</tr>
<tr>
<td>world income</td>
<td>0.78</td>
<td>34.29</td>
<td>637</td>
</tr>
</tbody>
</table>

CONCLUSIONS

Since many mutual fund expenses are fixed costs, asset growth ought to reduce the ratio of fund expenses to net assets. Using a longitudinal data set containing 30,757 observations on 2,610 funds over 19 years and estimating a cost function with the log difference of total fund expenses as the dependent variable, I find that elasticity of the change in fund costs with respect to the change in assets is less than one, implying the existence of economies of scale for the average mutual fund.
That conclusion comes with two caveats. First of all, I do not include brokerage commissions, the second largest fund expense, among total fund costs. Mutual funds pay at least $30 billion of dollars a year in transactions costs. Brokerage commissions, like management, distribution, and other administrative expenses, are paid directly from the net assets of the fund. Not only do mutual funds use brokerage commissions to pay transactions costs, funds are also permitted to use brokerage commissions to pay brokers for research services. These so-called ‘soft dollars’ are used to provide funds with “databases, data services, certain software and publications that provide access to and/or analysis of company, market and statistical data and proprietary research and analysis” (Wasatch Funds, 2012, p. 41). Soft dollars allow fund advisers to pay a portion of investment advisory expenses indirectly through commissions rather than directly out of fund assets. Brokerage commissions are an explicit fund cost. However, this cost is not included in the expense ratio reported in the fund prospectus nor is it listed in the statement of operations in the fund’s annual report to shareholders. Some funds report brokerage commissions on form NSAR-B or in the Statement of Additional Information to the fund’s prospectus, but many fund sponsors do not disaggregate brokerage commissions by fund. Additionally, funds do not report spreads on principal transactions in their filings with the SEC. There are no commissions or stated markups on principal transactions. Instead, purchases are executed at the ask price net and sales are executed at the bid price net. This all means that data on brokerage commissions and other transactions costs is not available for most mutual funds.

A second caveat is that the cost information I rely upon is the prices charged to fund shareholders not the management and administrative costs actually incurred by the fund operator. The actual economies of scale generated by asset growth may be understated if fund operators do not pass along to shareholders all of the scale economies they experience. For determining the reasonableness of fund fees under the standards upheld in Jones v. Harris Associates the actual cost of operating the mutual fund is the relevant variable. What matters for mutual fund investors, though, is how asset growth affects the fund’s expense ratio. This paper is able to answer that question. Mutual fund shareholders, especially those in small funds, can expect to see their fund’s expense ratio fall as the fund’s net assets increase.

REFERENCES


*Gartenberg v. Merrill Lynch Asset Management, Inc.* 694 F. 2d 923 (2d Cir. 1982).


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