The Components of Mutual Fund Fees

By Xiaohui Gao and Miles Livingston

Several research studies have found that mutual fund expense ratios decline as funds get larger. This paper decomposes the annual expense ratios of actively managed domestic equity funds into their component fees. Most of the observed decline in total expense ratios comes from the small fees paid to outside service providers and the large majority of this decline occurs for the smallest one third of funds. The largest component of the expense ratio, advisory fees, is essentially constant for larger funds. The second largest component, marketing fees, increases as fund assets grow.

I. INTRODUCTION

In the year 2004, investors in U.S. mutual funds incurred more than $50 billion in costs – $40 billion as reported in the expense ratio, $8 billion in portfolio brokerage commissions, and front-end and rear-end loads exceeding $3 billion.[1] The sheer magnitude of these numbers warrants a careful investigation of the components of mutual fund costs.

The fees charged to mutual fund investors are typically reported to investors in the total expense ratio. A number of previous studies have examined the total expense ratio for mutual funds and found that the total expense ratio decreases for larger sized funds.[2] A couple of studies have actually examined advisory fees and found similar results.[3] One possible interpretation is that bigger funds realize economies of costs and pass on these economies in the form of lower percentage fees for large funds.

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[1] These numbers are based upon our estimates from data on mutual funds downloaded from the SEC web site. The total annual expenses paid by investors in 2004 as estimated from Morningstar were $50.1 billion. Morningstar does not provide data on loads paid. In the year 2006, the total fees paid by all mutual funds recorded in the CRSP mutual fund database add up to $69 billion. This total includes equity, bond, and money market funds. According to CRSP, the total management fees paid by all funds in 2006 are $41 billion.

[2] These include the book by Baumol et alia (1990) studies by the Investment Company Institute (1999, 2004), the Securities and Exchange Commission (2000), and several academic studies, Malhotra and McLeod (1997), LaPlante (2001). These studies seem to conclude that smaller expense ratios for larger funds are an indication that mutual funds are performing in the interest of fund investors.

[3] Herman (1963) found that size had no impact upon the level of advisory fees. Freeman and Brown (2001) reach a similar conclusion. Deli (2002) found that mutual fund advisory fees decreased for larger sized funds using data for all mutual funds (except money market funds) for an 18 month time period beginning in mid-1997.

This paper examines the individual components of mutual fund expenses. We find that the reduction in percentage fees for larger funds is caused primarily by decreasing percentage fees for minor expenses including custodian, printing, registration, auditing fees, etc. These expenses are typically paid to outside service providers. The largest component of the total expense ratio, advisory fees, exhibits minimal reductions as mutual fund size increases.[4] The second largest component of the total expense ratio, marketing fees, actually increases as fund assets grow.

Division of our sample into three size groups allows further insight into the sources of economies of scale. Most of the economies of scale are derived from economies of scale for minor expenses for the smallest one third of funds. These minor expenses are provided by outside vendors. After the fund size reaches some point ($60 million dollars in our sample), economies of scale in these minor expenses are mostly exhausted. Managers may charge lower advisory fees as the fund assets continue to grow, but they actually spend more on marketing.[5]

These findings dispel the notions that economies of scale are widespread for all of the components of mutual fund fees and for all fund sizes. Most studies have fitted one fee function for the expense ratio and for funds of all sizes. Our analysis shows that the major source of economies of scale is for the smallest one third of funds for smaller services typically purchased from outside providers.

The analysis is based upon data electronically downloaded from N-SAR filings on the Securities and Exchange Commission web site. These N-SAR filings contain detailed information about the components of mutual fund fees. The decomposition of individual expenses is not typically provided in reports available to investors (such as the prospectus, the annual report, or the statement of additional information).

We use data for the nine-year period from 1996 through 2004 for actively managed domestic equity funds, between 1500 to 3000 mutual funds per year.[6] Thus, our results are for an extremely large sample of mutual funds over a nine-year period.

The rest of the paper is organized as follows. Section II discusses information provided by mutual funds to investors. Section III describes economies of scale and the setting of mutual fund fees. Section IV provides details about our data. Section V presents summary statistics for our sample of actively managed domestic equity funds. Section VI contains regression results. Section VII is a conclusion.

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[4] Our analysis also shows that family size has a relatively small impact upon percentage fees. Most of the reduction comes from nonaffiliated fees and occurs for the smallest one third of mutual funds.

[5] In NSAR, reported marketing expenses sometimes include 12b-1 fees. But this doesn't explain why marketing fees should increase as fund size increases.

[6] Previous studies have included many varieties of funds and simply added a dummy variable to try to correct for the different varieties, implicitly assuming a parallel shift in expenses for each variety of fund.

II. INFORMATION PROVIDED BY MUTUAL FUNDS TO INVESTORS

The Securities and Exchange Commission (SEC) has reporting requirements for mutual funds. Mutual fund investors must receive the fund prospectus, and upon request, the Statement of Additional Information (SAI). The mutual fund prospectus must report the total expense ratio (but not its components), which includes all annual expenses except for brokerage commissions. In addition, the schedule for front-end and rear-end sales fees and 12b-1 fees must also be reported. Brokerage commissions are reported in the SAI. The prospectus and the SAI are available in paper form from the individual mutual fund in theory. In practice, the SAI may be hard to obtain, although some mutual funds make them easily available by posting these documents on their web sites.

This information is also reported electronically to the SEC and is available on its Electronic Data Gathering and Retrieval (EDGAR) web site. The two major electronic filings containing important information for investors are the N-SAR reports and Form 485BPOS. However, the format of these filings (especially the N-SAR) is so intricate as to make them of minimal use to uninformed investors and a struggle to decipher for sophisticated investors. In addition, the sheer magnitude of the information provided makes their use by a layperson quite difficult.

The N-SAR report illustrates the point. N-SAR reports are filed electronically each year by registrants, which may include anywhere from one to 90 individual funds in the same family. Many mutual fund families report several registrants. Each registrant tends to be funds with similar investment objectives. For each mutual fund, several hundred different data items are reported for each of the mutual funds included in the registrant. The SEC rules allow some data items to be reported at the registrant level in the N-SAR reports.

Many mutual fund families report information about several funds in one Form 485BPOS. Mutual funds are allowed considerable latitude in formatting Form 485BPOS. Although SEC filings contain enormous amounts of information about individual funds and fund families, tabulating all this data into a format that can be used to compare different funds over time is extremely difficult.

To obtain a detailed breakdown of individual fund expenses, we downloaded all information contained in N-SAR reports for all reporting mutual funds from 1996 through 2004. We manually checked many data items to verify accuracy. In addition, we compared our data with data available from CRSP and Morningstar. Overall, the information in the N-SAR reports matches these other databases.

III. ECONOMIES OF SCALE AND THE SETTING OF MUTUAL FUND FEES

Economies of scale occur when the cost per unit of output decreases as output increases. These economies may result if a firm has fixed costs and constant variable costs. As the size of the firm increases, the fixed costs may be spread over more units and the cost per unit decreases. Economies may also occur if variable costs decrease as the size of output increases.

Several studies of mutual funds have found that larger funds have lower total expense ratios than smaller funds.[7] Three studies, Herman (1963), Deli (2002), and Freeman and Brown (2001) have examined economies of scale for advisory fees. Deli (2002) finds that realized economies of scale are passed along, at least in part, to investors. Herman (1963) and Freeman and Brown (2001) report minimal economies of scale for advisory fees. In Freeman and Brown (2001), reductions for advisory fees are confined to the largest funds. Freeman and Brown (2001) also show that institutional investors such as retirement funds pay markedly lower advisory fees than retail investors in the same mutual fund.

Our analysis differs from earlier research because we look at all of the individual component fees of the expense ratio, as well as the total expense ratio. The individual fees are compensation paid to service providers for the provision of different types of services. Some of these services are more likely than others to have economies of scale. Therefore, some fees may decline significantly with asset growth, while others do not. In addition, some service providers may be in a better position to retain realized scale economies rather than pass them on in the form of lower fees. Possible reasons for this advantaged position might include less competitive markets for some service providers or better bargaining power due to affiliations with fund management.

Advisory fees reflect advisors' compensation for managing the underlying portfolio.[8] Some mutual funds have step-down advisory fees structure, which indicate that fund advisors may experience economies of scale as fund assets grow.[9]

Many of the individual mutual fund service components obviously have primarily fixed costs and some small variable costs, such as auditing fees. A mutual fund with $5 billion of assets is unlikely to cost 5 times as much to audit as a fund with $1 billion of assets.

However, some other services might be expected to have a large variable cost component. An example would be servicing agent fees. These are costs of dealing with mutual fund investors directly. As the size of the fund increases, the cost of servicing investors depends upon the average account size and technological changes. In recent years, the importance of offering investors better telephone access and Internet access has increased and become a focus of competition among mutual funds. Since funds may be able to grow with effective advertising (Sirri and Tufano (1998); Barber, Odean and Zheng (2004)), many mutual funds may focus upon marketing and consequently marketing expenses may not exhibit economies of scale. However, marketing expenses may increase fund size and generate economies of scale for other expenses.

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[7] These include the book by Baumol et al. (1990), studies by the Investment Company Institute (1999, 2004), the Securities and Exchange Commission (2000), and several academic studies, Malhotra and McLeod (1997), Latzko (1999) and LaPlante (2001).

[8] Deli (2002) provides an excellent detailed discussion of mutual fund advisory contracts.

[9] In unreported results, we controlled for advisory contract type in our regressions and all the results remain unchanged.

The June 2000 General Accounting Office (GAO) report on mutual funds suggested that the mutual fund industry is a monopolistically competitive market.[10] A recent paper by Luo (2002) presented evidence consistent with this viewpoint. In a monopolistically competitive market, mutual funds compete on the basis of service (primarily past "performance") and not on the basis of fees. In a monopolistically competitive market, fee levels may vary widely but are not the primary factors attracting investors. Some mutual funds may choose to compete by keeping expenses low and appealing to informed investors. The majority of mutual funds appear to compete for assets on the basis of "performance." Since a great deal of academic evidence indicates that "winning" funds do not consistently outperform other funds (Jensen (1968); Carhart (1997)), the target market appears to be less-informed investors. That is, since past performance has little predictive ability, and percentage fees have a high degree of predictive ability of future net returns, most investors are choosing funds based on the wrong criteria.

IV. DATA

We download all N-SAR filings from the SEC's EDGAR website for the time period 1996 through 2004.[11] All regulated investment companies are required by the SEC to file two N-SAR reports each fiscal year.[12] Data are available on EDGAR back to 1993. However, prior to 1996, the sample is very small. Consequently, our data covers the time period 1996 to 2004.

From N-SAR filings, we collect the following information: fund type, fund family, expenses in each cost category, assets under management, turnover, loads, required minimum initial investment. We focus our analysis on open-end, actively managed, diversified domestic equity funds. We eliminate (1) funds that invest primarily in debt securities, (2) balanced funds, (3) index funds, and (4) funds that have more than 50 percent of assets in precious metals or foreign securities.[13]

We limit our analysis to actively managed diversified domestic equity funds to try to make the sample relatively homogeneous Studies examining the impact of mutual fund size on mutual fund expense ratios (Ferris and Chance (1987), Malhotra and McLeod (1997), LaPlante (2001), and on advisory fees (Herman (1963), Deli (2002), Freeman and Brown (2001)) have typically included many varieties of funds including domestic equity funds, bond funds, balanced funds, foreign funds, index funds, and money market funds. These studies attempt to adjust their regressions by adding a dummy variable for each type of fund, implicitly

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[10] Herman (1963) and Freeman and Brown (2003) also presented this argument.

[11] There is great variability of the beginning of the fiscal year for individual mutual funds. If the fiscal year ends in the first half of the calendar year, we assume that the fiscal year is the previous year.

[12] The N-SAR A covers the first six months of the fiscal year and the N-SAR B covers the full fiscal year.

[13] There are some reporting errors. Many fund series simply left the answers blank. We had to go through each fund series' name and drop it where the fund name suggests that it doesn't meet our criteria. For example, if a fund series is named "XXX index fund" yet is not classified as an index fund, we still drop this fund series from our sample.

assuming a parallel shift for each type of fund. Our sample avoids making this arbitrary assumption.

Fund series targeted at institutional investors usually have lower fees (Freeman and Brown (2001)). We exclude them to avoid biasing our results. We use the "lowest minimum initial investment required" to distinguish between institutional funds and retail funds, and we exclude the fund series if this minimum initial investment exceeds $25,000.

There may be reporting errors in some fees. We exclude all fund series where the reported value of total expenses was missing. In N-SAR filings, total assets and all components are supposed to be reported in thousands of dollars. However, some filings do not convert numbers into thousands. Based upon the total expense ratio, we exclude the bottom 1 percent and the top 1 percent of fund series.

Finally, we exclude fund series that report zero advisory fees. This keeps the sample invariant when we undertake the advisory fees analysis.

We define a no-load fund as a fund that has no front-end, no rear-end, and no 12b-1 fee. A load fund has one or more of these charges. A 12b-1 fee is an annual sales fee assessed for as long as an investor maintains holdings in a fund, although funds may change the 12b-1 fee over time. The maximum 12b-1 fee allowed is 1% per annum.[14]

In recent years, a number of mutual funds have introduced share classes with different loads. Typically share class A has a front-end load with low annual 12b-1 fees. Share class B has a high rear-end load that declines over time and high annual 12b-1 fees for the first several years of the investment before the shares ultimately convert to A-shares. Share class C has a low first-year back-end load and a high 12b-1 fee for the entire life of the investment. In addition, a number of mutual funds have other classes with different types of sales fees. When mutual funds report in the N-SAR forms, some mutual funds aggregate share classes and report them as one fund, while other mutual funds report the individual classes. For cases where multiple share classes are reported, we use the weighted average of the share classes as one mutual fund.

After all these data selection steps, we have 22,172 fund year series from 1996 to 2004.

V. SUMMARY STATISTICS FOR DOMESTIC EQUITY FUNDS

Our sample has virtually the entire universe of actively managed diversified domestic equity funds from 1996 through 2004.

Summary of expenses. Table 1 describes the various components of the mutual fund total expense ratio. Table 2 reports summary statistics for actively managed, diversified domestic equity funds for the number of funds (row 1), total assets (row 2), total brokerage commissions (row 3), total dollars in the expense ratio (row 4), dollar values for the components of the expense ratio (rows 5–9), and percent total expense ratios (rows 10 and 11).

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[14] Freeman (2007) provides a detailed discussion of the legal aspects of mutual fund sales fees.

Table 1: Types of Mutual Fund Fees

Fee	Definition
Advisory Fees	Fees paid to the investment advisor doing research and choosing securities for the portfolio.
Marketing Fees	Costs of marketing the fund, including 12b-1 fees*.
Servicing Agent Fees	Costs of dealing with investors in the fund, including keeping records of all the investor holdings and sending reports to investors.
Administrator Fees	Costs associated with the back office operations of the fund, including the placing of buying and sell orders with brokers.
Custodian Fees	Fees paid to a third party to hold and transfer the securities of the fund.
Printing Fees	Costs of printing up shareholder reports.
Registration Fees	Costs of registering new fund shares with SEC.
Directors Fees	Fees paid to the board of directors.
Auditing Fees	Fees paid to accounting firms for certifying the financial statements of the fund.
Legal Fees	Attorneys' fees.
Other Fees	Include bookkeeping fees, postage expenses, shareholder meeting expenses and other smaller fees and expenses.

*In the N-SAR filings, the majority of marketing fees are equivalent to 12b-1 fees.

In Table 2, the number of funds was increasing until 2004 (row 1). Total net assets under management for all open-end actively managed domestic equity funds peaked at $2 trillion in 2000 (row 2). In that year, the expense ratio (row 4) also reached its highest level, more than $18 billion in total. It's interesting to note that, during the bear market of 2001 and 2002, funds had fewer assets under management and they charged lower fees in terms of dollars (row 4). But the average expense ratio kept increasing in these two years (row 10). The asset weighted average expense ratio showed the same pattern, implying that this increase was not driven entirely by new small funds (row 11).

Our sample contains almost $2 trillion of assets in 2004. Total expenses were more than $16 billion and total brokerage commissions were an additional $4 billion. Advisory fees were approximately $10 billion out of the $16 billion in the total expense ratio.[15] Although brokerage commissions are *not* reported as part of the mutual fund expense ratio, Table 2 clearly shows that brokerage costs were the second-highest mutual fund cost after advisory fees. Both equally weighted and asset weighted expense ratios increased over time in our sample. The average total expense ratio in our sample is 114 basis points. This is the same as the actively managed domestic equity fund sample from CRSP in Chen and Pennacchi (2005).

[15] Brokerage commissions and loads are reported at the registrant level, which contains many fund series. We allocated assets weighted commissions and loads to each fund series.

Table 2: Sample Summary Statistics for Actively Managed Domestic Equity Funds

Data are downloaded from N-SARB filings using the SEC's EDGAR website for the period 1996 to 2004. The source is investment company form N-SARB. Only open-end actively managed domestic equity funds are included and there are 22,172 funds. Total net assets and all fees components are measured in billions of dollars (unadjusted for inflation). Equally weighted and asset weighted expense ratios are computed by dividing total expense by average TNA.

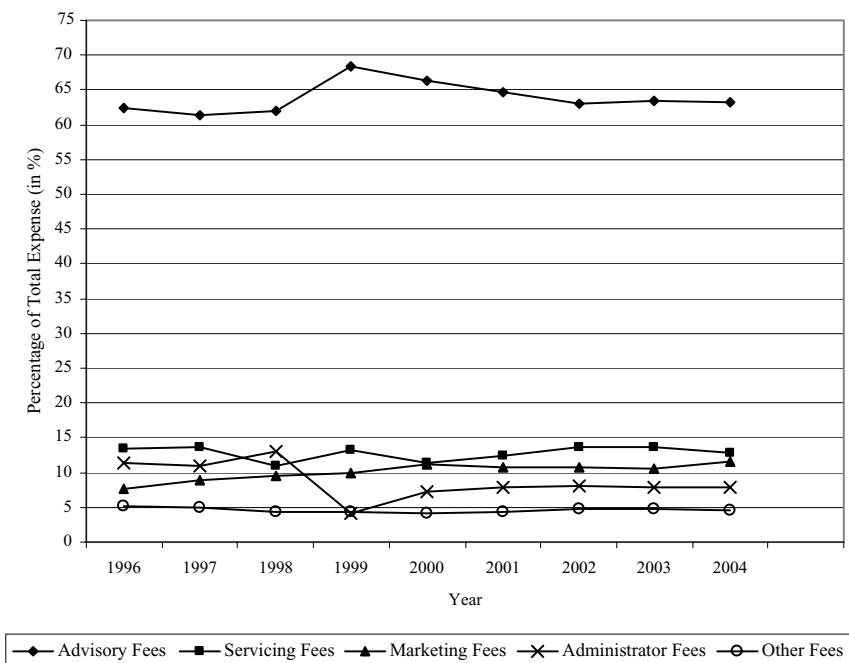|	Fiscal Year									
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2004/1996
1 Number of Funds	1481	1753	2173	2320	2710	3035	2993	3054	2653	–
2 Total Net Assets (in $Billion)	782	1,078	1,423	1,501	2,020	1,791	1,536	1,554	1,860	2.38
3 Total Brokerage Commissions (in $Billion)	1.07	6.13	4.22	2.41	3.17	3.70	4.35	3.91	4.21	3.93
4 Total Expenses (in $Billion)	6.27	8.39	11.31	13.34	18.42	16.93	14.97	15.06	16.45	2.62
5 Advisory Fees (in $Billion)	4.01	5.35	7.10	8.64	11.80	10.51	9.00	9.14	10.18	2.54
6 Servicing Agent Fees (in $Billion)	0.84	1.06	1.30	1.65	2.06	2.11	2.08	2.08	2.12	2.53
7 Marketing Fees (in $Billion)	0.66	0.97	1.54	1.94	2.81	2.51	2.22	2.09	2.36	3.58
8 Administrator Fees (in $Billion)	0.37	0.49	0.76	0.44	0.91	0.95	0.86	0.93	0.96	2.57
9 Other Fees (in $Billion)	0.40	0.52	0.61	0.66	0.84	0.84	0.81	0.83	0.83	2.08
10 Equally Weighted Average Total Expense Ratio (in BP)	109.8	107.5	109.3	111.8	111.9	114.9	119.1	120.9	116.7	1.06
11 Assets Weighted Average Total Expense Ratio (in BP)	78.4	76.0	77.5	86.8	89.1	91.6	94.3	94.1	86.1	1.10

Figure 1: Composition of Total Expense Ratio in 1996 to 2004.

This figure plots the composition of total expense ratio in the fiscal year 1996 to 2004. The sample contains 22,172 actively managed diversified domestic equity fund series during 1996 to 2004. We look at the main five expense categories: advisory fees, servicing agent fees, marketing fees, administrator fees and other fees. In each fiscal year, we calculate the average percentage for an expense category out of the total expenses. The average is weighted by individual fund's assets under management.

This further confirms that our sample is comparable to other related studies. The last column of Table 2 calculates the ratio of the 2004 level divided by the 1996 level. This ratio gives us a crude measure of the magnitude of increase during this time period. Marketing fees increased the most, followed by servicing agent fees.

Components of Total Expense Ratio. Figure 1 plots the percentage of the main four fee categories in the total expense ratio from 1996 through 2004. Advisory fees were the largest component of the total expense ratio (more than 65% on average), followed by servicing agent fees (varies between 12% and 14%), marketing fees (around 10% on average), and administrator fees (varies between 5% and 13%). The rest of the fees together represented only 5% of the total expense ratio. This composition remained essentially the same over time. The servicing fees and marketing fees became a slightly higher percent of the total expense ratio recently.

Table 3 presents summary statistics for the various components of mutual fund expense ratios. Fees as a percent of average total net assets are reported for 2004, as well as the average fee for all the funds between 1996 and 2004.[16] Average fees are reported in two ways – weighting each fund equally and weighting each fund by total net assets. Equally weighted fees were larger than asset weighted fees, indicating that larger funds had lower percent expenses. Comparing the fees in 2004 with the average from 1996 to 2004, most fees changed little over the sample period.

Throughout this paper, we categorize fees into two groups: major fees and minor fees. Major fees include the four largest fee components: advisory fees, servicing agent fees, marketing fees and administrator fees. All other fees are included in the 'minor' fees category. Assets weighted minor fees are much lower than the equally weighted average. Major fees do not have such a strong pattern. This motivates us to investigate the two categories of fees separately in our analysis.

In Table 3, there are differences in the number of funds reporting each type of expense. The reason is that some funds define some expense categories in different ways since there is no precise definition of some expenses. Thus, some funds may report part of their administrator expenses as management fees. Others may categorize some servicing agent fees as administrative fees. Some funds do not report either administrator expenses are servicing agent fees, but only advisory fees. Although some reporting differences exist, we believe that there is a great deal of information contained in the reported numbers.

Expenses versus Fund Size. Table 4 reports average percent fees in the expense ratio by type when mutual funds are sorted into 3 groups (terciles) by total net assets in each year. The cut-off points are \$59 million and \$272 million of assets respectively.[17] This univariate analysis yields several insights. All fees were lower for bigger funds. But the reductions in advisory fees, servicing agent fees and marketing fees were much smaller compared to the rest of the fees.

Figures 2 and 3 explain our major empirical findings. The 2,653 funds in 2004 were divided into deciles according to fund assets. We then calculated the equally weighted average fees within each decile and compared across different types of fees. In Figure 2, we graph the total expenses together with the four major expenses (advisory fees, servicing agent fees, marketing fees and administrator fees). Figure 3 investigates the smaller fees (custodian fees, printing fees, directors' fees, registration fees, auditing fees, legal fees and other fees). Since the first decile contains the smallest funds, both figures show that all fees had some level of economies of scale. However, comparing Figure 2 with Figure 3, we find that the smaller fees decreased much faster than the bigger fees when fund assets

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[16] We measure all the fees by dividing the actual dollar amount of the fees by the fund year's average assets under management. This ratio is always expressed in basis points.

[17] In each year, we sort fund years into three terciles by net assets. The first tercile is the smallest one third of the sample. The maximum net assets of the first and the second tercile are \$59 million and \$272 million respectively.

Table 3: Average Mutual Fund Expense Ratios: 2002 and 1996–2004

The sample is 22,172 actively managed diversified domestic equity funds that filed N-SARB forms for the period 1996 to 2004. Fees are expressed as a percent of net assets of the fund and in basis points. The equally weighted/assets weighted average fees are the equally weighted/assets weighted mean of all funds that report the fees. "Major" fees are the sum of advisory fees, administrator fees, servicing agent fees and marketing fees. All other fees are 'Minor' fees.

Expense Category	2004			1996–2004		
	Number of Funds Reporting	Equally Weighted Average Fees (in BP)	Assets Weighted Average Fees (in BP)	Number of Funds Reporting	Equally Weighted Average Fees (in BP)	Assets Weighted Average Fees (in BP)
Total Expenses	2,653	116.7	86.1	22,172	114.3	87.0
Advisory Fees	2,653	71.9	54.7	22,172	70.7	55.9
Servicing Agent Fees	1,873	13.4	11.4	15,666	14.9	11.3
Marketing Fees	1,721	16.2	12.7	11,725	14.4	12.6
Administrator Fees	1,644	10.7	5.1	12,760	13.1	4.9
Custodian Fees	2,313	5.5	0.9	19,482	9.8	1.0
Printing Fees	1,892	2.6	0.7	15,819	4.0	0.8
Directors Fees	2,238	1.6	0.2	17,925	2.7	0.2
Registration Fees	1,470	5.5	0.4	13,107	6.9	0.5
Auditing Fees	2,222	6.1	0.3	18,900	7.8	0.3
Legal Fees	2,039	2.9	0.2	15,859	3.3	0.2
Other Fees	2,390	9.2	1.7	19,707	12.3	1.6
Major Fees	2,653	112.2	84.0	22,172	113.0	84.8
Minor Fees	2,559	33.4	2.1	21,262	46.0	4.8

Table 4: Average Percent Expenses for Fund Size Categories

Table 4 reports the average percent fees for size terciles. The sample is divided into three groups based on fund assets in each year. The first tercile contains the smallest funds. Fees are expressed as a percent of net assets of the fund and in basis points. The first line reports number of funds in each group. The final column presents the reduction in each fee from the smallest to the largest group of funds measured as a fraction of the fees in the smallest group. For example, a value of .75 suggests that on average, the fees fall by 75% from the smallest to the largest category. Larger numbers suggest larger economies of scale. t-statistics are calculated for the actual level of reduction and are reported in parentheses. *, **, *** are statistically significant at levels 0.1, 0.05 and 0.01 respectively.

	First Tercile	Second Tercile	Third Tercile	
	Fund Assets < $59 million	$59 million < Fund Assets < $272 million	Fund Assets > $272 million	Overall Reduction
Number of Fund Years	7,386	7,390	7,396	–
Total Expense Ratio	247.4	127.4	105.2	0.57*** (35.11)
Advisory Fees	71.6	73.4	67.2	0.06*** (8.67)
Servicing Agent Fees	35.9	15.3	13.8	0.62*** (19.32)
Marketing Fees	27.9	29.6	24.7	0.11*** (5.92)
Administrator Fees	45.2	13.4	10.1	0.78*** (18.10)
Custodian Fees	28.5	5.0	1.8	0.94*** (36.11)
Printing Fees	13.5	3.0	1.7	0.88*** (23.68)
Directors Fees	11.1	1.0	0.3	0.97*** (18.99)
Registration Fees	33.6	4.2	1.2	0.96*** (20.39)
Auditing Fees	26.7	2.3	0.5	0.98*** (33.24)
Legal Fees	14.2	1.6	0.4	0.97*** (23.16)
Other Fees	36.3	5.4	2.5	0.93*** (24.08)

increased. Thus, these small fees contributed the most to observed economies of scale in the total expense ratio.

As we mentioned in Section IV, it is very hard to track funds through time using NSAR data. To further investigate the time series pattern in fees, we rely on the registrant name and individual fund name and track fees of 6,601 fund years, representing 1,145 distinct funds during our sample period. Figure 4 reports the frequency of annual change in advisory fees ratio and total expense ratio. The darker bar represents advisory fees and the lighter bar is the total expense ratio. Around 74% of annual changes in advisory fees cluster between −5 basis points and 5 basis points. Since we calculate the actual advisory fees by dividing dollar amount of advisory fees collected by total assets at fiscal year end, we consider annual change within 5 basis points as no change in advisory fees. At the same time, only 51% of fund years didn't change their total expense ratio. As
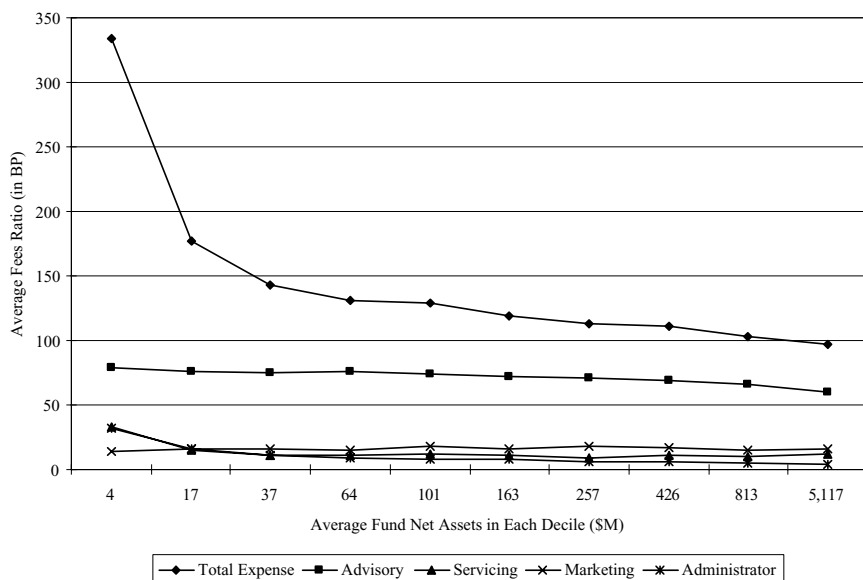
Figure 2: Major Expenses Across Fund Size Deciles in 2004.

Figure 2 plots the total expense and the four major expenses (advisory fees, servicing agent fees, marketing fees and administrator fees) across fund size deciles in 2004. The sample contains 2,653 fund series in 2004. All fees are expressed as basis points of assets under management. X-axis is average fund net assets in each decile. The Y-axis is equally weighted average fees within each decile. The first decile contains the smallest funds.

we can see in Figure 4, change in total expense ratio is more dispersed than that in advisory fees. The subsample used in Figure 4 greatly limits the sample size so our following multivariate analysis used the full sample. All our results remained qualitatively unchanged when analysis is applied to the subsample.

VI. PANEL DATA REGRESSION RESULTS

The preceding discussion suggests several questions that we now explore with panel data regressions. First, do larger funds have lower fees per dollar of assets? Second, which components of costs decrease the most as fund size increases? By examining the patterns of these cost components, inferences about the costs functions of investment advisors can be drawn.

Although our focus is upon the components of costs, our results are compared with other studies by first regressing the total expense ratio and then each fee component against the following independent variables:
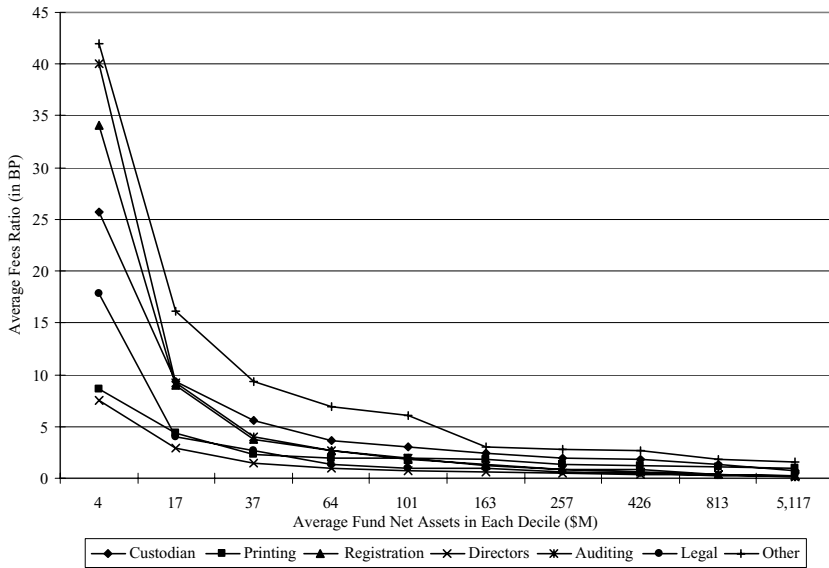
Figure 3: Minor Expenses Across Fund Size Deciles in 2004.

Figure 3 plots the seven minor expenses (custodian fees, printing fees, registration fees, directors' fees, auditing fees, legal fees and other fees) across fund size deciles in 2004. The sample contains 2,653 fund series in 2004. All fees are expressed as basis points of assets under management. X-axis is average fund net assets in each decile. The Y-axis is equally weighted average fees within each decile. The first decile contains the smallest funds.

(1) The natural logarithm of fund assets.
(2) The natural logarithm of the sum of assets of all other funds in the same fund family.
(3) The natural logarithm of total fees paid to directors in the fund family.
(4) Turnover in percentage.
(5) Year dummies and fund dummies.[18]

Table 5 gives a detailed description of each variable.

Fund size and family size are used to measure reductions in percentage fees as size increases. Turnover provides insight into the impact of fund activity upon costs. The natural logarithm of total fees paid to family directors indicates whether the total compensation paid to directors has an impact on other fees. We also use a load dummy to measure the difference between load funds and no-load funds. We use year and fund dummies to control for time and fund fixed effects.

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[18] We assigned a unique fund identifier number to each fund according to the fund name over the years. Year 1996 is dropped as the year base in our regression.
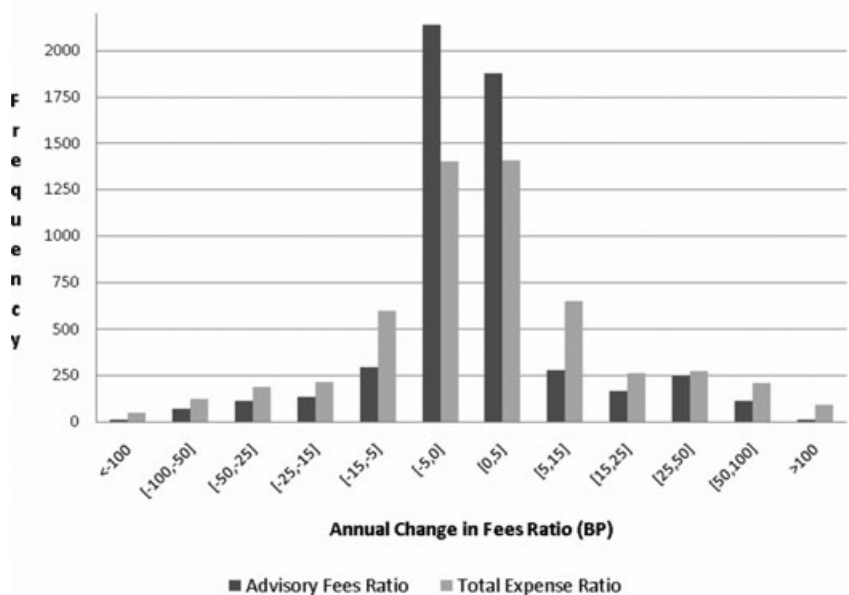
Figure 4: Histogram of Changes in Advisory Fees andTotal Expense during 1996 to 2004.

This histogram shows the frequency of annual change in advisory fees and total expense ratio for 6,601 fund years in 1996 to 2004. The 6,601 fund years represent 1,145 distinct funds. Both advisory fees ratio and total expense ratio are expressed in basis points.

The dependent variables in our regressions are relative fees (expenses divided by assets). Some other studies (Baumol et al. (1990)) use the translog function where the logarithm of total dollar expenses is the dependent variable. Both approaches use the logarithm of total dollar assets as an explanatory variable. In the Appendix, we show that economies (no economies, diseconomies) of scale are given by a negative (zero, positive) coefficient in the expense ratio regression and is equivalent to a coefficient less than (equal to, greater than) 1.0 in the translog regression. Our regressions will use the expense ratio because of its wide use in the mutual fund industry.

Major vs. Minor Expenses Regression. Table 6 reports cross-sectional regression results for three regressions: the total expense (fee) ratio, the major expense ratio (which includes advisory fees, servicing agent fees, marketing and administrator fees), and the sum of other smaller expenses. These smaller expenses include custodian, printing, registration, directors, auditing, legal and other expenses.[19]

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[19] In unreported results, we used Fama and McBeth (1973) procedure and all regression results remained unchanged.

Table 5: Definition of Variables

Variable	Definition
Total Expense Ratio	Ratio (in basis points) between fund year's total expenses and net assets under management
Advisory Fees Ratio	Ratio (in basis points) between fund year's advisory fees and net assets under management
Rest of the fees ratios are defined similarly.	
Log Net Assets	Natural logarithm of the fund year's net assets (in dollars) under management
Log DiffFamily Assets	Natural logarithm of the difference between the fund year's net assets (in dollars) and the fund family's net assets (in dollars)
If the fund year doesn't belong to any fund family, this variable is 0	
Log Family Directors	Natural logarithm of the fund family's total directors fees (in dollars)
This variable is 0 for stand-alone fund year.	
Turnover	The fund year's average turnover rate (in percentages)
Dummy Load	This dichotomous variable is one if the fund has either front-end, rear-end sales load or 12b-1 fees.
Dummy 1996	This dichotomous variable is one if the fiscal year is 1996.
Rest of the year dummy variables are defined in the same way	

The following is our regression model in each regression:

$$ExpenseRatio_{i,t} = \alpha_1 LogNetAssets_{i,t} + \alpha_2 LogDiffFamilyAssets_{i,t}$$
$$+ \alpha_3 LogFamilyDirectors_{i,t} + \alpha_4 TurnOver_{i,t}$$
$$+ \alpha_5 DummyLoad_{i,t} + \alpha_6 DummyYear_t + \alpha_{7,i} FundID_i + \varepsilon_{i,t}$$
$$(1)$$

For the total expense ratio, our results are consistent with many other studies. In the total expense ratio regression in Table 6, the coefficient for the natural logarithm of assets is −43.20. This indicates economies of scale. Because the natural number e equals 2.71, a slightly less than tripling of assets results in a reduction of the total expense ratio of 43.20 basis points.

Let us now consider the coefficients for the natural logarithm of net assets in each of the three regressions in Table 6. The total expense ratio regression has a large negative coefficient, suggesting considerable economies of scale. By looking at the other two regressions, the sources of these economies of scale become evident. More than 75 percent of the economies of scale (−33.87 out of −43.20) in the total expense ratio are the result of the smaller fees. A large proportion of these smaller fees are with nonaffiliated service providers. These nonaffiliated fees are driven

Table 6: Determinants of Mutual Fund Expenses

The sample is 22,172 open-end actively managed domestic equity funds in 1996–2004. Major expenses include advisory, servicing agent, marketing and administrator expenses. Minor expenses include custodian, printing, registration, directors, auditing, legal and other smaller expenses. Each expense regression is estimated by cross-sectional regressions with fixed fund and year effects. The fiscal year 1996 is dropped as the base. *, **, *** are statistically significant at levels 0.1, 0.05 and 0.01 respectively.

	N = 22,172 Dependent Variable		
Independent Variable	Total Expense Ratio	Major Expense Ratio	Sum of Other Smaller Fees Ratio
Log Net Assets	−43.20***	−9.32***	−33.87***
Log DiffFamily Assets	−1.83***	−0.39*	−1.44***
Log Family Directors	3.97***	1.40***	2.57***
Turnover	0.02***	0.02***	0.00
Dummy Load	13.21***	12.29***	0.93
Dummy 1997	2.87	0.65	2.21
Dummy 1998	11.15**	6.32***	4.83
Dummy 1999	13.25***	7.67***	5.58*
Dummy 2000	22.27***	10.19***	12.08***
Dummy 2001	21.72***	12.25***	9.47***
Dummy 2002	32.47***	19.98***	12.49***
Dummy 2003	24.20***	18.92***	5.28
Dummy 2004	26.11***	17.07***	9.04**
Constant	915.31***	260.15***	655.16***
Adjusted R-squared	0.16	0.06	0.19

by outside market competition. On the other hand, many of the major expenses (such as the management fee) are with affiliated providers, and the fees may not be so heavily influenced by the external market.

The size of the fund family also introduces small economies of scale in expenses. Family size includes all other funds, regardless of fund's style, within the same fund family. So being in a large family seems to help individual funds to reduce their expenses. The coefficient is −1.83, indicating a slightly less than tripling of family assets will reduce the total expense ratio by only 1.83 basis points. It is interesting to see that the fund family size has little impact on the major expenses, which suggests that the economies of scale at the fund family level mainly come from the smaller fees. This may result from the family's bargaining power with third-party service providers.

It is typical in the mutual fund industry to have the same individual director sitting on many fund boards in a single family (Tufano and Sevick, 1997). So

we sum all individual funds' payments to directors within the same fund family and use this total dollar amount as an explanatory variable in our analysis. This total directors' payments have a moderately positive impact (3.97 basis points) on fund expenses. The positive coefficient suggests that if all outside directors receive higher total dollar compensation, they may approve higher fees and fail to exercise their fiduciary duty. But as pointed out by Tufano and Sevick (1997), we need to interpret this coefficient with caution. Conceivably, funds that are more difficult to manage require higher expenses, as well as more compensation to directors.

The turnover rate generally has a positive impact on expenses. Load funds incur significantly higher expenses compared to their no-load peers. On average, they charge 13.21 basis points more.

The regression results in Table 6 have year dummy variables, with 1996 as the base case. There is a clear pattern for the coefficients for the year dummies to be higher in the later years in the sample than in the earlier years. The increases are larger for the major expense ratio regression than for the smaller fees regression. This suggests that total percent expenses have increased since the first year of our sample, 1996 after adjusting for the independent variables. Note that the raw statistics in Table 3 indicate that many expenses are about the same over time and some have even going down.

Individual Expense Regressions. Tables 7 and 8 report regression results for each of the individual expenses. Table 7 investigates the four major expenses individually (advisory, servicing agent, marketing, administrator fees) and Table 8 reports regression results for each individual minor expense. For each individual expense, we run the same regression as Equation (1).

The natural logarithm of assets has a positive impact upon advisory fees and marketing fees, but a negative impact on every other expense. Because the absolute value of the coefficients for advisory fees and marketing fees is very close to zero, larger funds tend to have essentially the same percentage advisory fees and the same percentage marketing fees as smaller funds.[20]

Family size has a minimal impact upon the major expenses in Table 8 (with servicing agent fees being the one exception) but affects many of the minor expenses in Table 9. Apparently, larger families are able to negotiate better fees from nonaffiliated providers.

Table 6 indicates that funds with higher loads have higher expenses. Table 7 shows that half of this effect comes from marketing fees (a coefficient of 6.31 in the marketing fees regression). However, load funds also have higher advisory fees and servicing agent fees.

The dummy variables for year in Tables 7 and 8 show a positive time trend with three exceptions, registration fees, directors fees, and legal fees.

In the marketing fees regression in Table 7, the coefficient for mutual fund size (log net assets) is positive and significantly different from zero. One possible

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[20] But as argued in Chen, Hong, Huang and Kubik (2004), when fund assets increase, it may become harder for the manager to actively manage the portfolio.

Table 7: Determinants of Mutual Fund Major Expenses

The sample is 22,172 open-end actively managed domestic equity funds in 1996–2004. Every expense ratio is estimated by cross-sectional regression with fixed fund and year effects. The fiscal year 1996 is dropped as the base. *, **, *** are statistically significant at levels 0.1, 0.05 and 0.01 respectively.

Independent Variable	N = 22,172 Dependent Variable			
	Advisory Fees Ratio	Servicing Agent Fees Ratio	Marketing Fees Ratio	Administrator Fees Ratio
Log Net Assets	2.65***	−5.12***	1.17***	−8.02***
Log DiffFamily Assets	−0.09	−0.27***	−0.04	0.01
Log Family Directors	0.10	0.70***	0.24***	0.36
Turnover	0.01***	0.00**	0.00**	0.005**
Dummy Load	1.93***	2.87***	6.31***	1.18
Dummy 1997	−2.04***	0.92	0.46	1.31
Dummy 1998	−0.30	3.11***	1.15***	2.36
Dummy 1999	0.95	2.91***	1.52***	2.28
Dummy 2000	−0.44	4.27***	1.50***	4.85***
Dummy 2001	1.09	5.00***	2.29***	3.87**
Dummy 2002	3.39***	8.20***	2.88***	5.50***
Dummy 2003	3.88***	7.87***	3.19***	3.98**
Dummy 2004	2.72***	6.86***	2.42***	5.06***
Constant	19.95***	100.47***	−12.16***	151.89***
Adjusted R-squared	0.04	0.05	0.14	0.04

interpretation of this positive coefficient is that there are diseconomies of scale for marketing expenditures. The positive association between marketing fees and size may also indicate that mutual funds with larger marketing fees are able to attract more assets. This interpretation suggests that marketing expenditures are quite effective in attracting assets, and would be consistent with the view that many mutual fund investors are naïve and consequently heavily influenced by marketing. This view is supported by the Jain and Wu (2000) study on advertising and fund flows, who find that funds with greater advertising attract significantly more new money.

Regressions for Terciles. The univariate statistics suggest that there may be some interactions between mutual fund size and some of our explanatory variables. In order to examine this possibility, the sample is broken down into three size groups (terciles). The results are reported in Tables 9 and 10.

Table 9 reports regression results for total expenses and major expenses for each tercile. The bottom (smallest) third of funds show significant economies of scale for all expenses. The upper two thirds of the sample show substantially smaller scale economies. This indicates that when a fund reaches a particular size,

Table 8: Determinants of Mutual Fund Minor Expenses

The sample is 22,172 open-end actively managed domestic equity funds in 1996–2004. Every minor expense ratio is estimated by cross-sectional regressions with fixed fund and year effects. *, **, *** are statistically significant at levels 0.1, 0.05 and 0.01 respectively.

	N = 22,172			Dependent Variable			
Independent Variable	Custodian Fees Ratio	Printing Fees Ratio	Registration Fees Ratio	Directors Fees Ratio	Auditing Fees Ratio	Legal Fees Ratio	Other Fees Ratio
Log Net Assets	−7.05***	−2.52***	−5.15***	−1.96***	−6.92***	−2.57***	−7.70***
Log DiffFamily Assets	−0.30***	−0.11**	−0.39***	−0.20***	−0.15*	−0.20***	−0.08
Log Family Directors	0.40***	0.29***	0.60***	0.39***	0.48***	0.37***	0.05
Turnover	0.004***	0.00	0.00	0.00	0.00	0.00	0.00
Dummy Load	−0.07	−0.02	0.84	−0.16	0.08	0.34	−0.08
Dummy 1997	1.69**	−0.10	−0.83	−0.22	0.97	−0.50	1.21
Dummy 1998	2.22***	0.41	−0.67	0.34	1.92**	−0.05	0.67
Dummy 1999	2.27***	0.96**	−0.96	−0.31	1.53*	−0.29	2.39
Dummy 2000	3.22***	0.94*	−0.26	−0.07	2.82***	−0.21	5.65***
Dummy 2001	2.87***	1.31***	−0.57	−0.45	1.51*	−0.17	4.98***
Dummy 2002	3.52***	1.48***	−0.77	−0.53	2.94***	0.22	5.63***
Dummy 2003	1.49*	0.21	−1.63	−0.65	1.38	−0.23	4.72***
Dummy 2004	2.20**	0.32	−0.62	−0.17	2.17**	−0.09	5.23***
Constant	136.34***	48.48***	101.88***	38.61***	130.45***	50.10***	149.31***
Adjusted R-squared	0.13	0.07	0.06	0.06	0.15	0.07	0.07

Table 9: Determinants of Mutual Fund Expenses within Size Groups

The sample is 22,172 open-end actively managed domestic equity funds in 1996–2004. The sample is divided into three groups based on fund assets in each year. The first tercile contains the smallest funds. Variable definitions and regression specifications are the same as in Table 7.

| | Dependent Variable | | | | | |
| | First Tercile N = 7386 Fund Assets < $59 million | | Second Tercile N = 7390 $59 million < Fund Assets < $272 million | | Third Tercile N = 7396 Fund Assets > $272 million | |
Independent Variable	Total Expense	Major Expense	Total Expense	Major Expense	Total Expense	Major Expense
Log Net Assets	−127.45***	−31.80***	−13.03***	−1.78*	−6.79***	−4.29***
Log DiffFamily Assets	−2.88**	−0.50	−0.73***	−0.35*	−0.59***	−0.54***
Log Family Directors	6.68***	2.65***	1.34***	0.66**	1.10***	1.02***
Turnover	0.03**	0.03***	0.01***	0.01***	0.06***	0.05***
Dummy Load	21.08	16.19**	7.26***	5.30***	5.20***	5.08***
Dummy 1997	−4.98	1.57	−0.40	−0.69	−0.07	0.28
Dummy 1998	8.95	11.93	3.66*	4.20**	1.07	1.54
Dummy 1999	18.97	17.34**	4.75**	4.75**	3.56***	3.58***
Dummy 2000	28.33	15.74*	5.24**	6.56***	4.25***	4.62***
Dummy 2001	20.55	15.39*	9.86***	10.37***	5.18***	5.56***
Dummy 2002	66.11***	36.79***	12.84***	13.17***	7.81***	8.20***
Dummy 2003	56.73***	37.37***	13.92***	14.22***	8.52***	8.82***
Dummy 2004	72.52***	41.05***	12.86***	12.30***	7.38***	7.73***
Constant	2218.12***	596.43***	353.57***	130.29***	232.08***	174.10***
Adjusted R-squared	0.23	0.07	0.07	0.08	0.11	0.11

Table 10: Determinants of Mutual Fund Major Fees within Size Groups

The sample is 22,172 open-end actively managed domestic equity funds in 1996–2004. The sample is divided into three groups based on fund assets in each year. The first tercile contains the smallest funds. Variable definitions and regression specifications are the same as in Table 7.

| | Dependent Variable | | | | | |
| | First Tercile N = 7386 Fund Assets < $59 million | | Second Tercile N = 7390 $59 million < Fund Assets < $272 million | | Third Tercile N = 7396 Fund Assets > $272 million | |
Independent Variable	Advisory Fees	Marketing Fees	Advisory Fees	Marketing Fees	Advisory Fees	Marketing Fees
Log Net Assets	7.01***	1.78***	0.39	0.82**	−2.14***	−0.18
Log DiffFamily Assets	−0.16	−0.07	−0.20*	−0.12*	−0.25***	−0.09*
Log Family Directors	0.45*	0.21**	0.16	0.37***	0.45***	0.18*
Turnover	0.01***	0.00	0.004***	0.00	0.03***	0.01***
Dummy Load	6.00***	8.23***	0.78	5.09***	0.13	3.36***
Dummy 1997	−1.56	1.12*	−1.52	0.05	−1.03	1.12***
Dummy 1998	1.99	1.79**	0.94	0.80	−0.47	1.49***
Dummy 1999	6.31***	2.11***	1.95	0.31	0.01	2.40***
Dummy 2000	2.14	1.26*	1.87	0.85	0.29	2.56***
Dummy 2001	5.77***	2.97***	3.12**	1.20*	−0.15	2.80***
Dummy 2002	10.27***	4.20***	3.87***	1.21*	−0.13	3.26***
Dummy 2003	9.76***	4.63***	4.63***	1.56**	0.16	3.17***
Dummy 2004	9.25***	4.37***	3.78***	1.48*	0.32	2.39***
Constant	−49.45***	−22.14***	64.45***	−2.90	108.16***	14.81***
Adjusted R-squared	0.01	0.23	0.02	0.18	0.09	0.09

the smaller expenses, which compensate nonaffiliated service providers, mainly consist of variable cost and no longer exhibit significant economies of scale. Our results suggest that this breakpoint likely happens when fund assets exceed $300 million.

The earlier regression results for the entire sample show that advisory fees and marketing fees were essentially constant for funds of all sizes. In order to refine this analysis, Table 10 reports regressions for advisory fees and marketing fees for each of the three terciles separately.

For the first tercile in Table 9, the coefficient for major expenses is a positive and significant 31.80 basis points. But for the first tercile (the smallest funds) in Table 10, the coefficients for the natural logarithm of net assets are positive in both the advisory fee and marketing fee regressions. This means that the economies of scale for major fees in the first tercile in Table 9 are largely the result of administrator fees and servicing agent fees. The same pattern is apparent in Table 4.

In the middle tercile in Table 10, the coefficient for advisory fees is not significantly different from zero, but the coefficient for marketing fees is a small positive number. For the third tercile (with the largest funds) in Table 10, the coefficient for advisory fees is a relatively small negative number and the coefficient for marketing fees is not different from zero. In the third tercile, the coefficient for advisory fees is −2.14, indicating that nearly a tripling of assets under management results in a reduction in advisory fees of 2.14 basis points. Thus, if the fund's assets increased from $5 billion to approximately $15 billion, the advisory fee would drop by only 2.58 basis points.

The pattern revealed by Table 10 is for mutual funds to continue to keep percentage marketing fees high even for the largest funds, at the same time that advisory fees remain at a roughly constant percentage of assets under management.

VII. CONCLUSION

This paper studies various components of total expense ratios for open-end, actively managed domestic equity funds in 1996 to 2004. We find that more than 75 percent of the previously documented economies of scale in fund expenses come from smaller fees, many of which are purchased from outside service providers. Advisory fees, the largest component of total expense ratio, are essentially constant for larger funds. The second largest component, marketing fees, increases as fund size increases. Furthermore, our analysis shows that the observed economies of scale are mainly driven by the smallest one third of funds. Larger funds exhibit minimal economies of scale.

VIII. APPENDIX

Elasticity and Economies of Scale

Assume that expense ratio is a linear function of assets.
    Then, the following two arguments are equivalent:

1 Elasticity of expenses with respect to assets is less than 1.
2 Expense ratio decreases with assets, which shows economies of scale.

Proof
$(1 \Rightarrow 2)$

$$EL_{EA} = \text{Elasticity of expenses with respect to assets}$$

$$= \frac{\text{Assets}}{\text{Expenses}} \times \frac{\partial(\text{Expenses})}{\partial(\text{Assets})}$$

$$EL_{EA} < 1$$

$$\Rightarrow \frac{\text{Assets}}{\text{Expenses}} \times \frac{\partial(\text{Expenses})}{\partial(\text{Assets})} < 1$$

$$\Rightarrow \frac{\partial(\text{Expenses})}{\partial(\text{Assets})} \times \text{Assets} - \text{Expenses} < 0$$

$$\frac{\partial\left(\frac{\text{Expenses}}{\text{Assets}}\right)}{\partial(\text{Assets})} = \frac{\frac{\partial(\text{Expenses})}{\partial(\text{Assets})} \times \text{Assets} - \text{Expenses}}{(\text{Assets})^2} < 0$$

Therefore, expense ratio decreases with assets also.
  The other direction of proof is similar.
  Furthermore, in our regression, we set out the equation as

$$\frac{\text{Expenses}}{\text{Assets}} = a_0 \times \ln(\text{Assets})$$

$$a_0 = \frac{\partial\left(\frac{\text{Expenses}}{\text{Assets}}\right)}{\partial(Ln(\text{Assets}))} = \frac{\partial\left(\frac{\text{Expenses}}{\text{Assets}}\right)}{\partial(\text{Assets})} \times \text{Assets}$$

$a_0 < 0 \Rightarrow$ There is economies of scale
  $\Leftrightarrow$ Elasticity of expenses with respect to assets is less than one

Therefore, to test the elasticity using translog function is equivalent to test economies of scale.

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X. NOTE ON CONTRIBUTOR/ACKNOWLEDGMENTS

Xiaohui Gao is a member of the Faculty of Business and Economics, The University of Hong Kong. She received her Ph.D. in finance and M.S. in applied math at the University of Florida. Gao's primary interests include initial public offerings and mutual funds.

Miles Livingston is Professor of Finance at the University of Florida. During summers, he teaches at Erasmus University in the Netherlands. He has taught at the University of Florida since 1982. He has also taught at the University of Wisconsin, the University of Oregon, Concordia University in Montréal, York University in Toronto, the College of William and Mary, and Erasmus University in the Netherlands. At the University of Florida, he teaches an undergraduate class (Debt and Money Markets), a Master of Accounting class (Fixed Income Security Valuation), and a Executive MBA class (Money and Capital Markets). His research interests include fixed income securities, mutual funds, and diversification. Professor Livingston is the author of two textbooks: Money and Capital

Markets (3 editions) and Bonds and Bond Derivatives (2 editions), which has been translated into Chinese.

Professor Livingston received his Ph.D. (1972) and an M.B.A. (1968) from New York University and a B.A. (1966) from Columbia University.