

Portfolio Transactions Costs at U.S. Equity Mutual Funds*

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Abstract

We study the trading costs for a large sample of equity mutual funds. Using the actual brokerage commissions paid in 2002 and estimating the implicit trading costs, we find that fund investors bear substantial portfolio trading costs. Equity funds incur an average annual explicit brokerage commission of 38 basis points and an average annual implicit trading cost of 58 basis points. When measured separately for different mutual fund styles, these costs are highest for small cap funds and lowest for large cap funds. About 46% of all small cap mutual funds have trading costs that are higher than the annual fees investors pay. We suspect that many mutual fund investors are completely unaware of these trading costs and simply assume that the reported expense ratio includes them. Our findings suggest that greater attention to trading costs might help investors make more informed mutual fund investment decisions and that greater disclosure of trading costs might benefit investors.

* This research was funded by the Zero Alpha Group (ZAG)

Portfolio Transactions Costs at US Equity Mutual Funds

The costs of investing in mutual funds are not limited to the explicit annual charges that are aggregated into mutual fund expense ratios. Portfolio trading that is directed by the fund's advisor gives rise to explicit and implicit transactions costs which can, in some cases, be higher than the published expense ratio. Information about annual expense ratios is readily available. The costs of trading, however, are not nearly as easy to find. This lack of availability is driven in part by the fact that the all-in costs of trading are much more nebulous than annual fees. While commissions on portfolio trades are easily quantifiable, the implicit costs of trading are much less clear-cut. Academics and practitioners have developed methods for estimating the implicit costs of trading, but they are exactly that – estimates. Since implicit trading costs cannot be known with certainty, these costs are not reported in any mutual fund document that is sent to investors or filed with the U.S. Securities and Exchange Commission (SEC). Though the explicit commissions associated with trading are known with certainty, they are not reported extensively but are typically buried deep in the fund's Statement of Additional Information. Consequently, most investors and financial advisors are completely in the dark about the portfolio transactions costs they bear in their fund investments.

As of July 2004, Morningstar tracked 11,806 equity mutual fund share classes which collectively held \$4 trillion in assets. The average dollar invested in these funds produced 0.926 cents (92.6 basis points) in annual fees, leading to total annual expenses in the most recent fiscal year of \$37 billion. The analysis that we undertake in this study suggests that portfolio transactions on each equity fund dollar generated 0.187 cents in brokerage commissions. In aggregate, equity fund investors incurred approximately \$7.5 billion in brokerage commissions. Implicit trading costs were 0.246 cents on the average invested mutual fund dollar, causing investors in aggregate to incur an additional \$9.8 billion on trades in the stocks in their funds' portfolios. Aggregated, the total cost of trading incurred by fund investors during fiscal year 2002 was about \$17.3 billion. This dollar amount is approximately 47% of the annual fees paid by fund investors in reported expense ratios. Our subsequent analysis demonstrates that for some types of funds the trading costs as a percent of annual fees can be much higher.

The purpose of our study is to present information about these lesser known costs in mutual fund investing. We first quantify the levels of brokerage commissions for a large sample of equity mutual funds. We then explore the determinants of brokerage commission levels and their relation to fund-specific characteristics. Finally, we estimate implicit costs for the funds in our sample by applying prior academic estimates of transactions costs in U.S. and foreign equity markets.

Expense ratios

A mutual fund is simply a portfolio of securities. A number of service providers must be hired to perform the various functions that are necessary for the operations of the fund to run smoothly. These service providers include the fund management company (which makes the day-to-day investment decisions for the fund portfolio), the fund distribution company (which sells the fund shares either wholesale to brokers or retail to

individual investors), the custodian (which keeps the portfolio securities in safe-keeping), the transfer agent (which maintains the records of the investors in the funds), attorneys (which write prospectuses and legal forms required by the SEC) and accountants (which audit the financial statements of the fund). All of these service providers enter into contracts with the mutual fund that are negotiated by the fund directors. The fees that these service providers earn are paid out of the net assets of the mutual fund on a periodic basis. Though paid periodically throughout the year, most investors are familiar with these fees as aggregated and quoted as an annualized percentage of the net assets in the fund – the mutual fund expense ratio.

The SEC requires full disclosure of fund expense ratios. Prospectuses that fund families send to investors have information on the expense ratio near the front of the document. The SEC does not assess the reasonableness of these fees, but certainly the expense ratio is easy for investors to find and to compare across different potential mutual fund investments

Because data on them are widely available, expense ratios have been the focus of many studies. One strand of research looks at trends and determinants of mutual fund expenses. Laplante (2001) finds that annual percentage fees declined marginally over the late 1990s. This decline is in the face of significant increases in assets under management, pointing to economies of scale that are passed on to investors at some mutual funds. Similar results are also found by some industry participants (see Investment Company Institute (1999, 2002, 2004). The more rigorous academic studies find that annual expense ratios generally detract from fund performance (see, for example, Elton, Gruber, Das and Hlavka (1993), Gruber (1996), and Carhart (1997)). On average, fund managers are unable to recoup the expenses that funds pay via better performance. Wermers (2000) finds that the underlying equity holdings of equity mutual funds do outperform the market, but that cash drag, annual expenses and transaction costs more than offset this outperformance. These findings suggest that basing fund investment decisions at least partially on fees is wise. Lower cost funds have a smaller drag on performance that active managers must overcome. Taken to their logical conclusion, these results may suggest that index funds, accompanied by the lowest expense ratios in the mutual fund industry, are a more logical long-run investment choice than more expensive actively-managed funds.

Costs of trading

Although expense ratios capture the contracted fees that investors bear by investing in mutual funds, the cost of portfolio trading is less visible. When an equity fund manager directs a trade for a fund portfolio, the trade generally incurs a commission. This commission is identical conceptually to the commission that an investor would pay to a broker for buying or selling a stock. However, because the fund is a large, institutional investor, it normally receives lower percentage commissions than an individual investor. In fact, it is precisely this lower cost of trading that allows mutual funds to offer efficient diversification to investors who may not be able to achieve it cost-effectively on their own. Typical institutional trading costs range from one to five cents per share.

Although it is less apparent to investors, trading also incurs implicit costs. Contrary to the idea that there is a single price at any given time for a specific stock, there are actually two prices – one for buying the stock and one for selling the stock. The difference between these prices is called the bid-ask spread. Therefore, if you simultaneously bought and sold 100 shares of a stock, you would actually incur a small loss even absent a trading commission. This loss occurs because you must buy at the higher of the two prices (the ask) and sell at the lower of the two (the bid). A potentially more significant implicit cost in the trading process is that a mutual fund, as a large investor, may actually move the prices of the stocks in which it trades. If a fund wishes to sell a very large amount of a stock, this significant selling pressure may reduce the price at which the fund is able to sell the stock (which is obviously bad for the fund). This change in the stock price that is driven by large trades is called market impact.

Portfolio trading in a mutual fund therefore exposes the fund shareholder to explicit commissions and implicit trading costs. The shareholders entirely bear these costs because the assets of the portfolio are valued net of these costs. The costs are not paid by the fund manager. Explicit commissions are easy to measure. Funds keep records of these commissions and report them to the SEC. Implicit costs are much more difficult to ascertain, although methods for measuring these are continually being refined. Estimated implicit costs are not reported by mutual funds. In this paper, we examine actual commissions paid by a large sample of equity funds. We also estimate the implicit trading costs from the turnover those funds incur and findings from prior studies on the magnitude of implicit trading costs.

Soft Dollars

In an ideal world, the advisory fee (a component of the expense ratio) should be full compensation to an investment adviser for research and advice. Brokerage commissions should be paid only for execution of orders to buy or sell. In practice at the institutional level, brokerage commissions frequently include payment for services in addition to order execution. Such payments are termed soft dollar arrangements. These payments may be for research provided to the advisers, access to information sources, computer equipment, and even personal services. The complication that soft dollars introduces for our purposes is that in the presence of soft dollar arrangements, measured commissions include a component that is not specifically for execution of trades. We have no way to extract that portion of commissions that might be paid for research. More broadly, most investors are unaware of these practices. Investors likely believe that the research that is conducted by fund managers is paid for out of the fees resulting from the contracts that the board of directors negotiates with the fund managers. Soft dollars in effect represent a way for the manager to avoid paying for research out of contracted fee with the fund and allow the manager to keep as profits a greater portion of the fee. In our view, the mutual fund advisers should be fully compensated through their advisory fee, and they should not pay for research and other services through brokerage commissions, since brokerage commissions are an additional direct charge to fund investors. Ideally, fund advisers should reduce their advisory fee by the amount of research they purchase with soft dollars. Whether this occurs in practice is an issue we may not be able to

discern. However, all else being equal, funds which are purchasing a significant amount of research with brokerage commissions should have lower expense ratios.

Trading cost data

The Difficulty of Obtaining Data

Anyone trying to objectively examine the level of mutual fund brokerage commissions is immediately struck by the difficulty of obtaining data on these commissions. Mutual fund brokerage commissions are reported in two ways to the SEC. First, the SEC requires mutual funds to report their brokerage commissions in a supplement to the prospectus entitled the Statement of Additional Information (SAI). Second, mutual funds report brokerage commissions in electronic format in a semiannual report to the SEC (form N-SAR).

The SAI is a document that contains information about a mutual fund which is not in the prospectus. Investors will only see an SAI if they explicitly request it. However, since most investors likely do not know that it exists, they rarely view this document. In addition to having hard copies of the SAI on hand to honor investor requests, mutual funds also file the SAI electronically with the SEC. The SAI is generally found as an attachment to the fund registration statement, which is required to be filed on a semiannual basis. Some mutual funds choose to report their brokerage commissions in the main part of the prospectus as well, but this is not required by the SEC.

Therefore, an investor wishing to use the SAI to gather information on brokerage commissions must either request the hard-copies of the SAI from the fund company, or attempt to access the SAIs via the SEC's Edgar database (<http://www.sec.gov/edgar.shtml>). The Edgar database is not exactly easy to use.¹ As most investors are not aware, fund families do not file forms with SEC for each individual fund in the family. Most often, several funds are grouped together into an entity called a "registrant" for purposes of filing. Therefore, a filing contains information on all of the funds in the registrant, not just the particular fund that an investor may be considering. While filing at the registrant level is less costly for fund families, it makes the job of extracting information for individual funds more difficult for investors. Many of the electronic registration statements, to which the SAI is attached, are over 100 pages long.

Mutual funds are also required to report their brokerage commissions in an electronic form called form NSAR. As with other filings with the SEC, mutual fund families are permitted to file NSAR reports for registrant groups of mutual funds within the family. Unfortunately, a registrant is required only to report total brokerage commissions on an aggregate basis for all of the funds in a filing. The registrant is not required to report brokerage commissions for each individual fund. Conceivably, the mutual funds in the filing for a registrant may have markedly different brokerage commissions. Attempts to extract accurate brokerage commission information from the NSAR are therefore subject to potential errors.

¹ See William Baldwin's article "Peekaboo!" in *Forbes*, September 20, 2004,

Our database of brokerage commissions paid by mutual funds in fiscal year 2002 comes from Lipper. The original source of this data is the Statement of Additional Information. The database contains brokerage commission data on 5,356 equity funds. We merge the Lipper data on brokerage commissions with mutual fund data from Morningstar to allow an analysis of the determinants of brokerage commissions.

Univariate analysis

Brokerage Commissions for average funds

Table 1 details the average brokerage commissions for the sample parsed in several different ways. The average equity fund paid 0.378% of ending net assets in brokerage commissions during fiscal year 2002. Brokerage commissions vary widely across different types of funds. As expected, international funds have higher commissions than domestic equity funds. This difference is statistically significant at the 1% level (the t-statistic for the difference is 4.56). There is also a large difference between the commissions for actively managed funds and index funds. The average actively managed fund pays 39.3 basis points per year in commissions, while the average index fund pays 7.1 basis points. The 32 basis point difference is highly significant with a t-statistic of 24.2).

We also divide the sample based on Morningstar investment style categories. Of the 9 Morningstar style box categories, large blend funds have the lowest average commission at 19.8 basis points while small growth funds have the highest at 51.5 basis points. The large blend category has a greater percentage of index funds (primarily S&P 500 index funds) than any of the other categories, which drives the average brokerage commissions lower for that category. When index funds are removed from the analysis, the average brokerage commissions for large blend, value and growth are 0.226%, 0.235%, and 0.328%, respectively. The difference between the large blend and large value funds is insignificant at traditional levels. Both of those categories are significantly lower than large growth at the 1% level.

For all three capitalization categories, growth funds have higher levels of brokerage commissions than value or blend funds. This may be due to higher turnover in growth strategies rather than higher average commissions on trades of growth stocks.

Brokerage commissions paid by the average investor

Studies of the simple average of expenses of mutual funds overstate the expenses that most investors pay. Since larger funds typically have lower expenses than smaller funds, and since more investors hold large funds (that is why the funds are large), the average investor is paying less in expenses than the average fund charges. To address this issue, studies of expenses often weight fund expenses by net assets. We do the same here for brokerage commissions since it is ultimately more interesting to consider the commissions paid by the average investor.

Table 2 presents the weighted average brokerage commissions for our sample of equity funds. Although the results in Table 1 show that the average fund paid 37.8 basis points in commissions in fiscal year 2002, the average investor incurred 18.7 basis points.

This difference suggests that larger funds pay lower commissions, either because they are less active traders or because they negotiate more favorable commission rates. Our subsequent multivariate analysis will shed some light on the determinants of brokerage commissions.

All of the comparative relationships across fund categories in Table 2 are similar to those in Table 1. International fund investors bear higher commissions than domestic fund investors. The average index fund investor paid only 1.6 basis points in commissions while investors in active funds paid 21.0 basis points in commissions. Large cap fund investors paid higher commissions than small and mid cap fund investors and growth fund investors paid higher commissions than blend or value investors.

The second column in the table shows the weighted average expense ratio for the funds in our sample. The average investor in the equity funds in our sample paid 1.02% in annual expenses in 2002. This is close to the 1.00% expense ratio that the ICI (2004) finds for all equity funds in 2002. The slight difference is likely attributable to the hybrid funds which the ICI includes in its analysis and which we exclude. The final column shows the level of brokerage commissions relative to expense ratios. For all equity funds, the average investor pays brokerage commissions that are 18.3% of the level of the expense ratio. Stated another way, brokerage commissions increase the all-in costs of holding mutual funds by 18.3% over the expense ratio.

Different categories of funds have substantially different ratios of commissions to annual fees. Perhaps surprisingly, the difference between domestic and international funds is small, owing to the fact that both commissions and annual fees are higher for international funds than for domestic funds. There is a large difference between active and index funds. So even relative to expense ratios, the costs of trading at index funds are lower than for active funds. In the Morningstar style categories, we find that growth funds exhibit higher ratios of commissions to annual fees than either blend or value funds. Small and mid-cap funds display higher ratios than large caps. Perhaps surprising is that small and mid-cap growth funds have ratios of commissions to annual fees that are as high or higher than emerging market equity funds.

Brokerage Commission Rates

The differing level of commissions for different mutual fund investment styles can be attributed to either varying amounts of trading across styles or different commission rates paid by the mutual funds across styles. We estimate brokerage commissions as a percent of assets traded for each mutual fund in the sample. To make this calculation, we first need to estimate the total amount of assets traded for each fund. If a fund does not have any redemptions or purchases of new fund shares, the amount of trading can be estimated as two times the turnover times the average net assets of the fund. However, if the fund is experiencing significant inflows or outflows, the turnover number will understate the actual amount of trading at the fund.² We thus estimate net flows into or out of the fund in 2002 using equation (1).

² Turnover is reported as the lesser of portfolio sales or purchases divided by average net assets. A fund experiencing significant inflows will likely have greater purchases than sales caused by putting new flows into equities. However, the turnover will be reported on the basis of sales.

$$\text{Net Flows} = \text{absolute value of } [(\# \text{ shareholders } 2002 - \# \text{ shareholders } 2001) * (\text{average account size } 2002 + \text{average account size } 2001) / 2] \quad (1)$$

The change in number of shareholders times the average account size provides an estimate of the net change in the amount of assets due to investor actions. The total amount of trading at a fund during the fiscal year is then calculated as shown in equation (2).³

$$\text{Trading} = (\text{Turnover} * 2 * \text{average net assets}) + \text{net flows} \quad (2)$$

Table 3 reports the brokerage commissions scaled by the assets traded for the funds in the sample. For this table, the total number of observations decreases due to a lack of information for some funds to calculate net flows. Table 3 shows both equally weighted (where each fund gets the same weight) and asset-weighted (where each fund is weighted by net assets) measures. The average fund has commission rates that are approximately 15 basis points. However, commission rates are different for different types of funds. The average foreign equity fund faces higher commission rates than the average domestic fund (the t-statistic for the difference is 9.41). Active funds pay much higher rates than index funds. This difference is statistically significant (the t-statistic for the difference is 6.44) and suggests that index fund investors enjoy lower costs of trading not only due to lower levels of trading but also due to lower negotiated commission rates.

Large-cap funds pay lower commission rates than mid-cap funds. The average large cap (across growth, blend and value) fund pays 12.2 basis points on trades vs. 14.6 basis points for mid-cap funds (t-statistic on the difference = 3.15). Small-cap funds pay higher brokerage rates than mid-cap funds (small-cap: 19.2 bp, mid-cap: 14.6 bp, t-statistic for the difference is 6.35).

For investment styles, value funds pay higher commission rates than either growth or blend funds. Value funds on average pay 17.6 bp vs. 13.1 bp for growth and

³Equations (1) and (2) together are not necessarily intuitive. As a quick example, assume the following variables for a hypothetical fund. Suppose a fund starts the year with 1,000 investors and has 1,500 investors by year end. Also assume the average account size increased from \$200 to \$300 and that turnover was 100% (or 1 times) over the year. Net flows would be calculated as follows:

$$\text{Net flows} = \text{absolute value of } [1,500 - 1,000] * [(300 + 200) / 2] = \$125,000$$

This number derives from the 500 new investors and the average account size of \$250 (500*\$250=\$125,000).

Average net assets is simply the average of the assets at the beginning of the year (1,000 shareholders times \$200 average account size = 200,000) and the end of the year (1,500*\$300 = 450,000) which is \$325,000. Therefore net trading, by applying equation (2) is shown below.

$$\text{Trading} = (1 * 2 * \$325,000) + \$125,000 = \$775,000$$

The intuition is that the fund sold \$325,000 of securities, used those proceeds to buy \$325,000 in replacement securities and put \$125,000 to work by buying securities. Therefore, the total amount traded is \$775,000

blend funds. The difference between growth and blend funds is not statistically significant. That value funds face higher rates is likely due to the practice of paying brokerage commissions on a cents per share basis. Since value stocks generally have lower prices than growth stocks, the same cent per share rate for a value stock tends to be a greater percentage of the trade than for a growth stock.

Determinants of Brokerage Commissions

The univariate analysis above only examines the effect of fund objectives on brokerage commissions. In this section, we run a multiple regression analysis on two brokerage commission variables: commissions as a percent of average net assets and commissions as a percent of assets traded. We include nine variables that we hypothesize might have an effect on the levels of commissions. The variables are listed in the first column of table 4, and the results of the analysis are shown in the second and third column.

When brokerage commissions are measure as a percent of average net assets in the fund, the turnover ratio is the most significant variable in explaining the level of brokerage commissions paid. Not surprisingly, funds with greater turnover pay higher commissions. Fund expense ratios are positively related to commissions. This result is somewhat puzzling, but is consistent with findings in Livingston and O'Neal (1998). We expected that soft dollar arrangements whereby fund advisors pay for research out of brokerage commissions would cause a negative relation between expense ratios and commissions. If research is purchased with higher commissions, management fees should be lower, all other things being equal.

The positive and significant coefficient on the foreign equity fund dummy variable is not surprising. Commissions on average are higher for foreign funds than for domestic funds. We find that specialty funds pay lower commissions as a percent of assets. This may suggest that managers who trade in a very focused group of stocks may be better at finding lower cost brokerage on those few stocks they most frequently trade. Index funds also pay lower brokerage than active funds. The size of the fund does not appear to have any meaningful impact on the brokerage commissions paid.

We include several variables that characterize the portfolio holdings of the mutual funds in the sample. The market capitalization is strongly negatively related to brokerage commissions. Small stocks are more costly to trade than large stocks on average. PE ratios are positively related to commissions, all other things being held equal. Thus funds investing in more growth oriented companies tend to pay out more per year in commissions. Finally, we find that funds with greater numbers of stocks have lower commissions. We have no reasonable explanation for this finding. Overall, our variables explain about 43% of the variability in brokerage commissions across our sample.

Next, we look at the determinants of brokerage commissions as a percent of assets traded. Our explanatory power drops to an R-squared of 21%. However, we still find some interesting relationships. The turnover ratio is negatively related to average brokerage commission rates, suggesting that funds that are more frequent traders negotiate lower brokerage commission rates. Expense ratios are positively related to brokerage commission rates. Perhaps stocks that cost more to research also cost more to

trade. We find that foreign funds pay greater commissions on a per trade basis and that specialty and index funds pay lower commissions.

The portfolio characteristic variables of median market cap, average PE ratio, and number of holdings are all negatively related to brokerage commissions as a percent of assets traded. Large stocks and growth stocks are less costly to trade than small and value stocks. It also appears that funds with more stocks obtain lower brokerage commission rates. This finding may be driven by the fact that more concentrated funds make larger trades since each portfolio position represents a larger part of the portfolio. Such managers may be willing to pay higher commission rates to brokers who can minimize implicit costs of trading very large blocks of stock.

Implicit Trading Costs

While commissions are the most visible form of trading costs, most researchers and consultants agree that implicit trading costs are larger than explicit commissions for institutional investors. Keim and Madhavan (1998) summarize the literature on implicit and explicit trading magnitudes. They find, as other researchers do, that characteristics of the order are strong determinants of trade cost. Large trades and trades in smaller capitalization stocks incur greater implicit trading costs.

Because the implicit costs of trading may change over time, we use the most recent published research on these costs in our estimation of the implicit trading costs for the mutual funds in our sample. Two recent papers quantify the trading costs for stocks in US markets. Bessembinder (2003) uses data on 300 Nasdaq and 300 NYSE from July 1 through December 31, 1998. He stratifies the sample by market capitalization, designating categories for large cap, mid-cap and small cap stocks. For each stock in the sample, all trades over the six-month period are collected. Peterson and Sirri (2003) utilize a shorter time period but include a larger number of stocks. Their study examines a two week period in June 1997 and a second two week period in July 1997. Their sample is all SuperDOT system orders sent to the NYSE over the sample periods. They also cut their sample by market capitalization, but designate four quartiles as opposed to large, mid, and small cap.

As with other studies of implicit trade costs, several measures are calculated to quantify these costs. The most common measures are quoted spread and effective spread. The quoted spread is simply the difference between the quoted bid and ask prices. Such a measure assumes that trades are executed at the prevailing bid and ask. This measure is intuitive and easy to measure since data on bids and asks are readily available. In this paper, we concentrate on the effective spread. The effective spread is two times the difference in the price at which the trade is executed and the midpoint between the quoted bid and ask spread at the time the trade is executed. This method estimates that the “true” value of the security is mid-point between the prices at which you can buy (ask) and sell (bid) the stock. If you indeed purchase at the ask price or sell at the bid price, then this method of measuring implicit costs is the same as the quoted spread. However, many purchases and sales of stocks occur at prices that are better than the quoted bid or ask price. The effective spread takes into account this “price improvement” that may occur on orders. Multiplying by two simply transforms the spread into an estimate of “round-trip” implicit costs.

Peterson and Sirri (2003) find the following effective spreads for their sample. Quartile 4 (largest stocks) exhibits roundtrip effective spreads of 25 basis points. Quartiles 3, 2, and 1 (smallest stocks) have effective spreads of 51, 79, and 185 basis points respectively.⁴ Bessembinder (2003) reports effective spreads in cents per share, not in basis points. However, he also reports average prices for the stocks in his sample. It is easy to convert cents per share into average basis points on the amount traded. We take the average cents per share reported in each of the three market capitalization categories and divide that number by the average price of the securities in each category. Bessembinder (2003) conducts this analysis for both NYSE and Nasdaq stocks. We take the simple average of the effective spread for each exchange in each size category to estimate the effective spreads faced by mutual funds. The effective spreads from Bessembinder (2003) are 31 basis points for large cap stocks, 66 basis points for mid-cap stocks and 132 basis points for small cap stocks.⁵

The results from the two studies are similar. If we average the middle two quartiles from Peterson and Sirri (2003), we get 65 basis points for mid-cap stocks – almost identical to the 66 basis points in found by Bessembinder. Peterson and Sirri find lower costs for large-cap stocks, 25 basis points, compared to Bessembinder’s estimate of 31 basis points. However, Bessembinder looks at Nasdaq and NYSE stocks while Peterson and Sirri study only NYSE stocks. If we confine Bessembinder’s analysis to just NYSE stocks, we get 24 basis points, again almost identical to Peterson and Sirri. The largest difference between the two studies is for small cap stocks. This difference does not appear to be due to a difference in the exchanges from which the samples are drawn. Using only NYSE stocks, Bessembinder reports a cost of 90 basis points versus 185 basis points in Peterson and Sirri. The differences in these estimates are beyond the scope of our study. However, to be conservative, we use the following effective spreads when estimating implicit trading costs for U.S. mutual funds: 25 basis points for large cap stock funds, 65 basis points for mid-cap stock funds, and 132 basis points for small cap stock funds.

The studies of implicit trading costs in international markets are more limited than those of U.S. markets. Domowitz, Glen and Madhavan (2001) look at 42 countries and estimate brokerage commissions and implicit costs from 1996 to 1998. Interestingly, the implicit trade costs are on par with large cap US stocks and are far lower than for U.S. mid-cap and small-cap stocks. Because there are so few studies against which to benchmark these results, we do not estimate the implicit costs for international equity funds and concentrate instead on the domestic funds in our sample.

For each fund in our sample, we estimate the implicit trading costs by multiplying the estimated bid-ask spread for the market capitalization category by the turnover ratio. We then take the average and weighted average across style categories. These numbers are reported in Table 5. As with brokerage commissions, implicit trading costs differ significantly across market capitalization categories. Any differences among investment

⁴ See Peterson and Sirri (2003), Table 6, page 277.

⁵ For the large cap stocks, the average effective spread in basis points is 26.4 for NYSE stocks and 36.6 for Nasdaq stocks. 26.4 is determined by taking the average of the 7 time lagged effective cents per share spreads (found in table 5) and dividing by 32.78, the average price for NYSE large cap stocks in the sample. This number is then multiplied by two to give a roundtrip cost. We do the same for Nasdaq stocks and then take the simple average.

styles (growth, blend and value) are driven solely by differences in turnover ratios between the styles since we apply the implicit costs differently only with respect to market capitalization. Consistent with the literature on costs of trading, implicit costs on average are higher than brokerage commissions. For the average domestic equity fund, implicit costs are 58.0 basis points, compared to 36.1 basis points for brokerage commissions. The average investor pays 24.6 basis points per year in implicit costs, compared to 18.2 basis points in commissions. The average small cap fund incurs over 100 basis points per year. Even after adjusting implicit costs by weighting by net assets, small cap growth fund investors incur average implicit annual costs over 100 basis points.

Table 6 illustrates the level of implicit costs relative to fund expense ratios. The average fund investor incurs implicit trading costs that are about a quarter of the stated expense ratio. However this number is significantly different across market capitalization categories. Small cap investors incur significantly higher implicit costs relative to expense ratios.

Finally, we combine the explicit brokerage commissions with the estimated implicit trading costs to come up with an all-in cost incurred by mutual fund investors. For all of the funds in the sample for which we have complete trading cost data, we sum the implicit and explicit costs and then divide by the expense ratio. These results are presented in Table 7. The average investor in domestic equity funds incurs trading costs that are 43.4% as large as the stated expense ratio. Different style categories exhibit substantially different trading costs. Growth funds have higher than average trading costs as a percent of annual expenses: 43.1%, 86.0% and 123.2% for large cap, mid cap and small cap funds respectively. Value funds are lower and blend funds are in between growth and value funds.

Perhaps a more interesting way to view the data is to determine how many funds have trading costs that are higher than the expense ratio. For small cap funds, 46% of all funds have all-in trading costs that are higher than the annual expenses investors pay. About 21% of mid cap funds fall into that category as do 7% of all large cap funds. In the small cap category, 17% of all funds have implicit trading costs that are twice the level of annual expenses.

Conclusion

Mutual fund investors can easily find information on annual expense ratios that funds charge. However, another cost of mutual fund investing is the cost inherent in portfolio trades directed by fund advisors. This cost can be divided into explicit and implicit trading costs. Explicit costs are brokerage commissions, and these can be found by investors who are willing to dig into somewhat obscure fund documents. We find that these commissions are substantial, amounting in many cases to as much as half of the annual fees. Implicit costs are not reported to fund investors in any document and can only be estimated. Estimates are subject to potential error for any individual fund, but for a large sample of funds, we can estimate implicit costs with greater confidence. Using estimates of effective spreads for U.S.-traded stocks, we find that implicit costs borne by mutual fund investors are higher than explicit costs.

Both explicit and implicit costs differ among fund styles. Small cap funds incur higher costs, followed by mid-cap and large cap funds. All-in trading costs borne by

domestic fund investors total 43.4% of the expense ratio. However, a significant percentage of funds have trading costs that are higher than their annual expense ratio.

Overall, investors should be aware of these trading costs, and that they are not included in the expense ratio. In addition, mutual funds can transfer some fees from the expense ratio to trading costs through soft dollar arrangements. It would be nice if investors could easily see how much fund trading is costing them. Given that they cannot, investors should be aware that trading costs are especially high for funds that invest in growth stocks, small cap stocks, foreign stocks, funds with high turnover, and funds with high expense ratios. Passively managed index funds have particularly low trading costs.

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Table 1**Average Brokerage Commissions as a Percent of Net Assets for Equity Funds in 2002**

This table reports brokerage commissions for fiscal year 2002 expressed as a percent of average net assets. All style categories are from Morningstar Principia Pro Plus for mutual funds. “Foreign Funds” have no U.S. equity exposure. “World Funds” include exposure to U.S. as well as foreign stocks. The sample contains 5,356 equity funds for which Lipper data has brokerage commissions.

	Mean	Min	Max	N
All Equity funds	0.378	0	12.70	5,356
Domestic	0.361	0	12.70	4,273
International	0.448	0	4.80	1,083
Active	0.393	0	12.70	5,122
Index	0.071	0	1.21	234
<u>Morningstar Categories:</u>				
Large Growth	0.326	.001	2.83	701
Large Value	0.233	0	3.37	558
Large Blend	0.198	0	6.35	784
Mid Growth	0.484	.011	3.81	448
Mid Value	0.376	.008	2.36	185
Mid Blend	0.482	.01	12.70	170
Small Growth	0.515	.001	4.26	410
Small Value	0.371	.001	2.07	181
Small Blend	0.330	.004	1.73	188
Specialty	0.495	0	3.89	648
World Stock	0.383	.034	1.63	215
Foreign	0.456	0	4.80	535
Emerging Markets	0.609	0	2.53	112
Pacific/Asia	0.275	.067	0.76	25
Europe	0.337	0	1.74	84
Japan	0.375	.026	1.19	36

Table 2
Weighted Average Brokerage Commissions as a Percent of Net Assets for Equity Funds in 2002

This table shows average brokerage commissions and expense ratios for fiscal year 2002 expressed as a percent of average net assets. Both variables are weighted by net assets. Therefore, these numbers are indicative of what the average investor in these funds incurs. All categories are from Morningstar Principia Pro Plus for mutual funds. “Foreign Funds” have no U.S. equity exposure. “World Funds” include exposure to U.S. as well as foreign stocks. The sample contains 5,356 equity funds for which Lipper data has brokerage commissions.

	Brokerage Commissions/ Ave Net Assets	Expense Ratio	Brokerage commission / Expense ratio
All Equity funds	0.187	1.02	18.3%
Domestic	0.182	1.00	18.2%
International	0.236	1.21	19.5%
Active	0.210	1.12	18.8%
Index	0.016	0.25	6.4%
<u>Morningstar Categories:</u>			
Large Growth	0.237	1.17	20.3%
Large Value	0.134	0.87	15.4%
Large Blend	0.098	0.77	12.7%
Mid Growth	0.401	1.38	29.1%
Mid Value	0.227	1.12	20.3%
Mid Blend	0.219	1.14	19.2%
Small Growth	0.370	1.28	28.9%
Small Value	0.233	1.17	19.9%
Small Blend	0.201	1.00	20.1%
Specialty	0.283	1.50	18.9%
World Stock	0.188	1.15	16.3%
Foreign	0.259	1.21	21.4%
Emerging Markets	0.399	1.57	25.4%
Pacific/Asia	0.203	1.71	11.9%
Europe	0.217	1.16	18.7%
Japan	0.102	0.84	12.1%

Table 3
Average Brokerage Commissions as a Percent of Assets Traded for Equity Funds in 2002

This table reports brokerage commissions for fiscal year 2002 expressed in percent of average net assets. The first column presents equally-weighted averages. The second column presents asset-weighted averages where each fund in the sample is weighted by the net assets in the fund. All categories are from Morningstar Principia Pro Plus for mutual funds. “Foreign Funds” have no U.S. equity exposure. “World Funds” include exposure to U.S. as well as foreign stocks. The sample includes 3,142 equity funds for which Lipper has brokerage commissions and assets traded data.

	Equally-Weighted Mean Brokerage Commissions per Assets Traded	Asset-Weighted Mean Brokerage Commissions per Assets Traded	N
All Equity funds	0.151	0.115	3,142
Domestic	0.143	0.110	2,530
International	0.180	0.159	612
Active	0.154	0.128	3,027
Index	0.057	0.027	115
<u>Morningstar Categories:</u>			
Large Growth	0.109	0.099	428
Large Value	0.154	0.138	339
Large Blend	0.112	0.079	490
Mid Growth	0.124	0.122	263
Mid Value	0.190	0.165	112
Mid Blend	0.152	0.125	100
Small Growth	0.174	0.186	243
Small Value	0.225	0.190	116
Small Blend	0.196	0.132	97
Specialty	0.153	0.121	342
World Stock	0.156	0.150	140
Foreign	0.169	0.166	292
Emerging Markets	0.261	0.225	59
Pacific/Asia	0.192	0.147	16
Europe	0.143	0.141	44
Japan	0.122	0.100	18

Table 4
Determinants of Brokerage Commissions for Equity Funds in 2002

This table presents regression analysis of brokerage commissions on fund-specific variables. Brokerage commissions, *Turnover*, *Expense Ratio* and *Net Assets* are from Lipper. All other variables are from Morningstar. *Foreign Equity* is a dummy variable that equals one if the fund holds primarily foreign stocks and zero otherwise. *Specialty Equity* is a dummy variable that equals one if the fund is a domestic specialty fund and zero otherwise. *Index* is a dummy variable that equals one if the fund is an index fund and zero otherwise. *Log Market Cap* is the natural logarithm of the median market capitalization of stocks held in the fund's portfolio. *Average PE Ratio* is the average price to earnings ratio of stocks in the fund's portfolio. *Log Number of Holdings* is the natural logarithm of the number of securities held in the fund's portfolio. The sample includes 4,400 equity funds for which Lipper and Morningstar have complete information.

	Dependent Variable: Brokerage commissions as a percent of net assets	Dependent Variable: Brokerage commissions as a percent of traded assets
Independent variable:		
Constant	0.712* (16.7)	0.0041* (24.0)
Turnover	0.084* (47.8)	-0.000063* (-4.02)
Expense Ratio	0.032* (5.32)	0.000067 (2.94)
Foreign Equity	0.102* (9.19)	0.00019* (4.41)
Specialty Equity	-0.053* (-4.25)	-0.00015* (-3.10)
Index	-0.080* (-4.14)	-0.00044* (-5.62)
Log net assets	-0.001 (-0.81)	0.000012 (1.83)
Log market cap	-0.052* (-20.2)	-0.00015* (-14.8)
Average PE Ratio	0.0037* (4.41)	-0.000029* (-9.08)
Log Number of Holdings	-0.034* (-6.40)	-0.00016* (-7.62)
R-square	0.43	0.21
Observations	4,400	2,601

Table 5
Average Implicit Trading Costs for Domestic Equity Funds in 2002

This table reports estimated implicit trading costs for fiscal year 2002 expressed as a percent of average net assets. The first column presents equally-weighted averages. The second column details asset-weighted averages where each fund in the sample is weighted by the net assets in the fund. All categories are from Morningstar Principia Pro Plus for mutual funds

	Unweighted Mean Implicit Trading Costs	Weighted Mean Implicit Trading Costs	N
All Domestic Equity funds	0.580	0.246	3,570
Active	0.601	0.274	3,339
Index	0.172	0.048	231
<u>Morningstar Categories:</u>			
Large Growth	0.310	0.239	701
Large Value	0.159	0.100	558
Large Blend	0.224	0.107	784
Mid Growth	0.750	0.673	448
Mid Value	0.574	0.290	185
Mid Blend	0.450	0.310	170
Small Growth	1.56?	1.13?	410
Small Value	1.11?	0.511	181
Small Blend	1.42?	0.667	188

Table 6
Weighted Average Implicit Trading Costs for Domestic Equity Funds in 2002

This table reports average estimated implicit trading costs and expense ratios for fiscal year 2002 expressed as a percent of average net assets. Both variables are weighted by net assets. Therefore, these numbers are indicative of what the average investor in these funds incurs. All categories are from Morningstar Principia Pro Plus for mutual funds.

	Implicit Trading Cost	Expense Ratio	Implicit Trading / Expense ratio
All Domestic Equity funds	0.239	1.00	25.5%
Active	0.274	1.12	25.1%
Index	0.049	0.25	28.4%
<u>Morningstar Categories:</u>			
Large Growth	0.239	1.17	21.7%
Large Value	0.100	0.87	12.9%
Large Blend	0.107	0.77	12.7%
Mid Growth	0.673	1.38	54.7%
Mid Value	0.290	1.12	26.9%
Mid Blend	0.310	1.14	33.4%
Small Growth	1.13?	1.28	94.2%
Small Value	0.511	1.17	54.4%
Small Blend	0.667	1.00	86.4%

Table 7
Weighted Average Total Trading Costs for Domestic Equity Funds in 2002

This table presents average total trading costs for fiscal year 2002 expressed as a percent of average net assets. Total trading costs are the sum of brokerage commissions and estimated implicit trading costs. Trading costs are weighted by net assets. Therefore, these numbers are indicative of what the average investor in these funds incurs. All categories are from Morningstar Principia Pro Plus for mutual funds.

	Total Trading Cost	Expense Ratio	Total Trading Cost / Expense ratio
All Domestic Equity funds	0.415	1.00	43.4%
Active	0.480	1.12	44.6%
Index	0.064	0.25	37.8%
<u>Morningstar Categories:</u>			
Large Growth	0.475	1.17	43.1%
Large Value	0.232	0.87	29.4%
Large Blend	0.205	0.77	30.0%
Mid Growth	1.07?	1.38	86.0%
Mid Value	0.518	1.12	47.1%
Mid Blend	0.526	1.14	52.0%
Small Growth	1.50?	1.28	123.2%
Small Value	0.745	1.17	75.3%
Small Blend	0.868	1.00	107.3%