# FEES AND TRADING COSTS OF EQUITY MUTUAL FUNDS IN 401(K) PLANS AND POTENTIAL SAVINGS FROM ETFS AND COMMINGLED TRUSTS

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**Abstract**

As the role of 401(k) and similar defined-contribution plans continues to expand in our retirement system, plan participants are paying more of the cost of financing their retirement income. This study analyzes the trading costs and fees of the 100 largest domestic equity mutual funds held in defined-contribution pension plans for the years 2004 through 2008. The pricing of the actively managed funds in this sample cost the average plan 0.70 of a percentage point or more in annual returns. By shifting investment options from managed mutual funds to exchange-traded funds (ETFs) or commingled trusts, 401(k) plans can align the fees they pay more closely with the expense of the services they use. This realignment can allow an average plan to reduce its administration and management fees between 0.20 and 0.40 percent of assets. In addition, the shift to ETFs and commingled trusts that hold ETFs can reduce average trading costs 0.50 percent of assets or more for participants holding managed equity mutual funds. The fees and trading costs of the domestic equity funds in this sample are not correlated with the performance of the funds. The funds with the greatest expenses tended to divide evenly between those funds that outperformed and those that underperformed the market by the largest margins.

## Introduction

Increasingly, people are depending on 401(k) and similar defined contribution plans for their retirement income. As a result, participants in these plans are paying more of the cost of financing their retirement income. Much of this cost depends on the pricing of the investment options provided by their plans, options in which mutual funds play a substantial role. At year-end 2008, domestic equity mutual funds held $650 billion, or almost half of the assets of 401(k) and 403(b) plans that are invested in mutual funds (Investment Company Institute 2009a).

This study examines the fees and trading costs for domestic equity mutual funds held in defined-contribution pension plans during the five years from 2004 through 2008. Others have studied the fees paid by participants and sponsors in various defined contribution plans or have studied the fees and trading costs of domestic equity mutual funds generally.[1] Because the pricing and activity of funds held in retirement accounts tend to differ significantly from that for the universe of funds and because trading costs can be at least as large as the fees explicitly charged by equity mutual funds, this study considers the fees and trading costs for the 100 largest domestic equity mutual funds held in defined-contribution pension plans as of December 2007.

This study finds that the design and pricing of domestic equity mutual funds held in retirement accounts take a significant toll on the returns earned by the average investor. By shifting the investment options of a retirement plan from actively managed mutual funds to ETFs and commingled accounts, and by aligning the plan's fees more closely with the cost of its services, the average 401(k) plan can reduce its annual fees and trading costs by 0.70 percent or more of the assets invested in domestic equities. This potential saving, representing about 10 percent of the real return on domestic equities, can increase the value of a participant's accumulated savings in these assets by nearly one-eighth at the end of a 35-year career.

The first section of this study provides an overview of the fees and costs incurred by shareholders of mutual funds. The second section describes the data used in this study. The third describes the methodology used to estimate trading costs. The fourth section reports the

[1] See, for example, The Investment Company Institute (2009a, 2009b); Deloitte (2009a); and HR Investment Consultants (2008) regarding fees in 401(k)-type plans. For trading costs in domestic equity mutual funds, see Chalmers, Edelen, and Kadlec (2000); Karceski, Livingston, and O'Neal (2004); and Edelen, Evans, and Kadlec (2007).

findings. Consistent with findings from other studies, we find that trading costs for the average fund in this study's sample are nearly the same magnitude as their explicit fees. We also find that fees and trading costs were not correlated with mutual funds' ability to produce excess returns after considering the funds' exposure to market risks. The fifth section estimates the savings that ETFs and commingled trusts offer 401(k) plans. Although the average mutual fund in this study's sample paid returns, net of all fees and transaction costs, that were competitive with market returns given the funds' exposure to market risks, ETFs and commingled trusts could offer higher net returns by reducing fees and cutting trading costs. The final section concludes.

**The Structure of Fees and Costs in Mutual Funds**

401(k)-type plans provide a range of valuable financial services that allow their participants to accumulate wealth in diversified pools of funds that are invested in stocks, bonds, and other capital market securities. The cost of providing these services is covered by fees paid by participants in 401(k) plans and, to a lesser extent, by employers who sponsor these plans (Deloitte 2009a; Investment Company Institute 2009b).[2] The most common explicit fees within plans are assessments per dollar of assets – expense ratios – and per capita assessments. Altogether, these explicit fees, relative to the value of accounts, range from 0.7 to 1 percent of balances in average defined-contribution plans. In addition, plans also incur less explicit transaction costs that result from their asset managers' trading activity. Studies of actively managed equity mutual funds find, on average, that their trading costs, a component of total transaction cost, are about as large as their explicit fees (Karceski, Livingston, and O'Neal 2004; Edelen, Evans, and Kadlec 2007).

The fees collected through the expense ratio account for about three-quarters of all explicit fees (Deloitte 2009a). The expense ratio covers much of the cost of administering plans – providing promotional information, answering participants' questions, handling contributions or withdrawals, keeping records, and issuing statements – and a portion of the cost of managing

[2] Some costs can be paid only by settlors, the sponsoring employers, who establish and maintain 401(k) plans. Fees covering these costs cannot be charged to the plan or directly paid by participants in the plan. These costs – including fees for studying, designing, adopting, or changing a plan – must be paid by the plan's sponsor. Also, any fees for reporting the plan's status within the sponsor's financial statements must be paid by the sponsor.

plans' pools of investments – managers' salaries, pools' own back-office expenses, the cost of conducting investment research, and other expenses not arising from trading assets within the pools. This bundled fee, which is common in the mutual fund industry, is a very simple means of covering a plan's administration and management costs. But, this fee can reallocate wealth within a pension plan from participants with higher balances to those with lower balances. Much of the cost of administration and management is relatively constant for all participants, yet the participants pay fees in proportion to their balances. Consequently, reliance on expense ratios effectively reduces the returns on larger balance accounts. The alignment of fees with costs treats a plan's participants more equitably as their balances grow and can allow the entire plan to monitor and control its expenses as its aggregate balances expand.

A pool's transaction cost comprises its trading cost – the commissions and price concessions that it pays as a result of its trading activity – and the opportunity cost of delayed or missed trades.[3] Mutual funds report the commissions they pay for trading equities in their Statements of Additional Information, which supplement their annual reports. They do not report the price concessions they pay to trade securities. Both these components of trading cost are included in the effective prices a pool pays or receives for securities, and therefore are charged directly against the value of the pools' assets as trades occur. The less visible opportunity cost of delayed or missed trades likely exceeds trading cost (Wagner 2003; Gastineau 2005; Kissell 2006).

Trading costs can be substantial because orders submitted by investment pools tend to move prices. Dealers and other counterparties try to mitigate their risks of providing liquidity too cheaply and of missing market trends when trading with pools (O'Hara 1997; Harris 2003; Kissell 2006). Because dealers commit to buying or selling stocks at their quoted prices, they are prone to being exploited by better informed traders, a risk they cover by setting low bid and high ask prices. A dealer retains the option to fill small trades from uninformed investors within the bid-ask spread, closer to the market price. Professional investors who place larger orders are more likely to pay not only the cost imbedded in the full bid-ask spread, but also the cost of accepting even greater price concessions to fill their orders, partly because dealers recognize that large trades from investment pools often cluster (Puckett and Yan 2008). In this study's sample

[3] Large pools also incur various other costs, such as custodial fees or registration fees.

of mutual funds, clustering is substantial. In most quarters, for more than half of the stocks traded most by these funds, the change in positions by the funds either acquiring or selling the stock, whichever predominates, amounts to more than three times the change in positions by the funds moving in the opposite direction.[4] In most quarters, for more than one-third of the commonly traded stocks, this ratio exceeds eight times.

Trade-offs exist among the costs incurred by investment pools. Pools negotiate the commissions they pay to their broker-dealers. Higher commissions can purchase more support in conducting transactions, which can reduce a pool's unreported transaction costs (Harris 2003). Higher commissions also can provide pools with "soft dollars," allowing pools to obtain other services from their broker-dealers (Edelen, Evans, and Kadlec 2008). Soft-dollar arrangements can reduce pools' own direct back-office expenses, which allow the pool to charge a lower expense ratio (Harris 2003). As a result of these and other trade-offs, the cost structures within investment pools inevitably entail some cross-subsidies among the services they provide their investors.

Trading costs within 401(k) plans are important for at least two reasons. First, trading costs can be a substantial drag on performance, especially for very actively managed equity pools. After allowing for the sum of trading costs and other fees, studies find that most mature equity funds generally fail to match the performance of a market index fund.[5] Even pools that seem to produce superior returns for a time can fail to do so over longer intervals if the risk premium in its return is at first mistaken for a profit margin.

Second, trading costs can transfer wealth among different types of investors within an investment pool (Kopcke, Vitagliano, and Muldoon 2009; Haslem 2007). All investors in a pool share the pool's trading costs in proportion to their investment in the pool. If all investors traded

[4] We calculate a diffusion index for each stock by dividing the absolute value of the net change in positions for all of the funds in this study for each quarter by the sum of the absolute values of the changes in position for each fund. The median diffusion index is about 0.55. This is equivalent to a ratio of positive to negative changes in position, whichever is greater, of 1.55/0.45=3.44.

[5] See, for example, Standard & Poor's (2009), Bogle (2007), Malkiel (2007), Barras, Scaillet, and Wermers (2009). Other studies find evidence that some large funds can outperform the market by presciently overweighting asset classes and sectors yielding the highest risk-adjusted returns (Brinson, Hood, and Beebower 1986; Carhart 1997; Bollen and Busse 2005; Boyson 2008; Busse and Tong 2008).

their shares in the pool equally frequently and in amounts in proportion to their balances, then this sharing of the pool's trading costs would be equitable. But, when some of the pool's investors trade more aggressively than others, the aggressive investors pay trading costs only in proportion to their average balances, not in proportion to their larger share of trading activity. Accordingly, when 401(k) plans offer their participants the opportunity to invest their money in pools that also include other share classes held by investors who trade more actively, the plans' participants sacrifice returns by subsidizing the trading costs of these other investors. Also, if a 401(k) plan includes investors who trade aggressively, their activity is subsidized by other participants whose accounts are charged for the activity of the more aggressive traders.

**The Data**

This study covers the 100 largest domestic equity mutual funds held in defined-contribution pension plans as of December 2007 (Pensions & Investments 2008). These funds are listed in Appendix A. The study analyzes the fees and trading costs for these funds for the years 2004 through 2008. For this study, a domestic equity fund invests at least 90 percent of its assets in domestic issues, and its investment objective specifies a domestic orientation. The total investment of defined-contribution pension plans in the 100 mutual funds at the end of 2007 was $649 billion, or just over half of the assets held by defined-contribution plans in domestic equity mutual funds (Investment Company Institute 2009a).

The CRSP data on Wharton Research Data Services (WRDS) provides the monthly net asset values and returns for each mutual fund. CRSP also provides the data for the expense ratios, turnover ratios, and investment style of the funds. Lipper provides the commissions as reported in each fund's Statement of Additional Information plus additional information on funds' expenses. Thomson-Reuters data on WRDS provides the quarter-end holdings of equities by each fund. TAQ data on WRDS provides the bid-ask quotations, the trade volumes, and trade prices for equities traded on the New York Stock Exchange, the American Stock Exchange, and the Nasdaq Stock Market. The data for estimating four-factor models of excess returns for each fund are from the Fama-French data library. Finally, this study obtains additional information directly from funds' annual and semiannual reports.

This study estimates the trading volume in each stock for each fund from the reported changes in quarterly holdings, adjusted for splits and mergers. This method does not include a fund's trades into or out of positions when those trades are reversed during the quarter in which they occur. Other studies that compare changes in quarter-end positions with the actual trades reported semiannually by funds in the SEC's Form N-SAR find that the quarterly changes, on average, account for more than 80 percent of the purchases or sales by many mutual funds (Edelen, Evans, and Kadlec 2007, 2004). These studies report that estimates of trading volume using quarterly changes in positions underestimate total trading volume and, as a result, total trading costs by approximately one-fifth on average. In this study's sample of mutual funds, quarterly changes likely underestimate trading volume by a similar amount. The funds report turnover rates, on average, of 48 percent over the five-year sample, suggesting average trading volume near 100 percent of assets.[6] The average annual trading volume derived from quarterly changes is 75 percent of assets. Accordingly, quarterly changes will tend to yield conservative estimates of trading volume and cost for this sample of mutual funds.

The data for quotes and trades for each stock are screened to compile a consistent set of data for the period from 2004 through 2008, using trading data from the middle month in each quarter. This study matches all reported trades with the last bid-ask prices quoted in the exchange in which the transaction took place. This study subtracts one second from the reported time of trades to correct for reporting lags in aligning trades with quotes (Lee and Ready 1991; Edelen, Evans, and Kadlec 2007). If the bid-ask quotes were entered more than one minute before the trade, the trade is dropped from consideration. Also, if the trades occur in call sessions, after trading halts, in basket transactions, or are subject to other special conditions, the trade is dropped from consideration. This study eliminates quotes when bid-ask spreads are greater than 20 percent of the bid price. It eliminates trades and quotes in which price reversals exceeding 10 percent occur in three consecutive transactions.

## Methodology

[6] The turnover rate appearing in public filings equals the value of all stocks bought or of all stocks sold, whichever is smaller, divided by the average value of assets. Consequently, the value of all trading is more than twice the reported turnover rate.

The trading cost of mutual funds is represented by the effective bid-ask spreads that they pay as they trade and the price impacts elicited by their trading. Effective bid-ask spreads are estimated from volume weighted spreads, and price impacts are estimated from a model following Lee and Ready (1991), Hasbrouck (2004), Glosten and Milgrom (1985), Glosten and Harris (1988), and Edelen, Evans, and Kadlec (2007).

The cost of bid-ask spreads for trading stock *s* in quarter *q* is the volume weighted spread for all *n* transactions in the quarter:

$$VWS_{s,q} = \sum_{i=1}^{n} \left[ \left| \frac{P_{s,i} - M_{s,i}}{M_{s,i}} \right| \cdot \left( \frac{V_{s,i}}{\sum_{j=1}^{n} V_{s,j}} \right) \right],$$

where *P* represents the price at which the stock traded, *M* represents the midpoint of the quoted spread immediately before the trade, and *V* represents the unsigned volume of shares traded. This volume weighted spread, which includes small trades as well as trading by pools, likely understates the full bid-ask spread paid by actively managed mutual funds.

The price impact of a trade is the change in the midpoint of quoted spreads that occur with the trade. The estimated price impact for trading stock *s* in quarter *q* is proportionate ($\lambda_{s,q}$) to a nonlinear function of the unsigned volume of trading (Kempf and Korn 1999).

$$\left| \frac{M_{s,q,v} - M_{s,q,v-1}}{M_{s,q,v-1}} \right| = \gamma_{s,q} \cdot V_{s,q,v}^{\ \delta_{s,q}},$$

where this equation is estimated over the set of distinct five-minute intervals *v* in the middle month of each quarter.

The total annual trading cost for mutual fund *f* in year *y* relative to its total net assets, *TNA*, is the sum of the commissions it paid, *Com*, the bid-ask cost, *BAC*, and the price impact cost, *PIC*, of its trades during the year:[7]

$$BAC_{f,q} = \sum_{s=1}^{\#s} P_{s,q} \cdot V_{f,s,q} \cdot VWS_{s,q} / TNA_{f,q}$$

$$PIC_{f,q} = \sum_{s=1}^{\#s} P_{s,q} \cdot V_{f,s,q} \cdot \left(\gamma_{s,q} \cdot V_{s,q,v}{}^{\delta_{s,q}}\right) / TNA_{f,q}$$

$$TTC_{f,y} = Com_{f,y} / TNA_{f,y} + \sum_{q} BAC_{f,q} + \sum_{q} PIC_{f,q}$$

Actively traded mutual funds seek superior returns that cover these trading costs, the other costs that constitute total transaction costs, and the explicit fees they charge their shareholders. These superior returns also should cover any additional risk that results from active management. To estimate the net comprehensive benefit from this trading, this study estimates both the Sharpe Ratio and the alpha from a four-factor model for each mutual fund in the sample.

The Sharpe ratio for a fund *f* is its average excess return – the average difference between its return $r_{f,q}$ and the three-month Treasury bill rate $r_q$ each quarter – divided by the standard deviation of that spread.

$$AveER_f = \sum_{q=1}^{n} (r_{f,q} - r_q) / n$$

$$SR_f = \frac{AveER_f}{\sqrt{\sum_{q=1}^{n} \left( \left(r_{f,q} - r_q\right) - AveER_f \right)^2 / n}}.$$

This ratio expresses the excess return, after trading costs and other costs, per unit of risk that an investor would have realized from holding a mutual fund. This measure does not consider the correlation between the mutual fund's returns and the returns on the investor's other

[7] Chan and Lakonishok (1995) and Lipson and Puckett (2006) report that institutional trades take, on average, nearly two or more days to complete, with a significant effect on the prices of securities traded, especially when selling. Given the concavity of price responses (the average estimate of $\delta$ is significantly less than 1) and the evidence for herding, the assumption that trades can be completed within one five-minute interval (a high degree of liquidity) likely understates price impact costs.

assets. It is best used when a mutual fund is not held with other assets that diversify the mutual fund's idiosyncratic risk.

Alpha is the constant term in the four-factor pricing equation for each mutual fund.

$$r_{f,q} - r_q = \alpha_f + \beta_f (rm_q - r_q) + \sum_{i=1}^{3} \phi_{i,f} r_i + \varepsilon_{f,q},$$

where *rm* is the return on the broad market portfolio of equities and the $r_i$ represent the returns on market factors reflecting market capitalization, book-to-market values, and momentum (Fama and French 1993; Carhart 1997). The coefficients $\beta$ and $\phi$ represent the exposure of a fund's assets to the risks from market factors. Alpha measures the extent to which a fund provides an excess return beyond that which covers its exposure to these market factors. Alpha is an appropriate measure of performance for a fund that is held in a diversified portfolio, which can offset all but the fund's systematic risk.

**Findings**

The top panel of Table 1 describes trading costs by quintile of mutual funds ranked by their median total trading costs for the period 2004 to 2008. The mutual funds in quintiles that represent higher total trading costs also have higher turnover ratios. The median total trading cost is only 11 basis points for the quintile of funds with the lowest total trading cost. The median cost for the highest quintile is almost 2 percentage points. In each quintile, the price impact accounts for the greatest share of total trading costs. In the middle quintile, for example, the price impact of trades accounts for three-quarters of total trading costs; brokerage commissions, one-sixth; and bid-ask spreads, only one-twentieth. The results are very similar in all but the lowest quintile, which includes a higher share of index funds that traded less frequently, mostly in relatively liquid stocks.

Expense ratios tend to rise with total trading costs in this sample of equity mutual funds. For all but the lowest quintile, median trading costs are more than one-half the size of the median

expense ratio.[8] For the top two quintiles, median total trading costs exceed the median expense ratios.

The bottom panel shows trading costs by quintile of mutual funds ranked by the median size of their total net assets for the years 2004 through 2008. Trading cost and expense ratios tend to fall with the size of equity mutual funds. From the bottom quintile to the top quintile of funds, ranked by assets, median total net assets rise more than tenfold. From the lowest two quintiles to the highest three quintiles, median total trading cost falls from a range of 0.70 to 1.15 percent of assets to a range of 0.40 to 0.56 percent of assets.

Mutual funds try to cover their expense ratios and total transaction cost, which includes trading cost, by earning greater excess returns for their shareholders as a result of their managing their assets. Of the 100 domestic equity mutual funds analyzed in this study, 86 funds have existed since 1998. Table 2 compares the performance of these 86 funds to market standards. The negative Sharpe ratios in the panel for index funds reflect the generally weak performance of stocks compared with Treasury securities from 1998 through 2008. Across the size quintiles for all funds shown in the top panel, there is no clear trend in either the median Sharpe ratio or median alpha. The Sharpe ratios for all funds in the top panel exceed the Sharpe ratios for the panel showing index funds. But, the similar values of alpha for all funds versus index funds (except for the lowest size quintile) show that the managed funds, in general, earned returns commensurate with their exposure to market risks. Managed funds, on average, did not earn substantial extraordinary returns given their blends of market risks. The relatively high alpha for all funds in the lowest size quintile is consistent with previous results, showing that small funds can outperform the market more easily than large funds (Bogle 2007; Boyson 2008). These observations also apply to the lower quintiles for the growth, value, and core categories. The top size quintile for value and core funds in this interval of 11 years also outperformed the top quintile for the index category.

Table 3 provides a more direct comparison of alpha with fees and trading costs. The median alpha for this sample is just above zero, matching the alphas of most index funds shown

[8] These total trading costs do not include the opportunity cost of missed or delayed trades. Total transaction cost is measured indirectly in the results for the funds' Sharpe ratios and alphas.

in the previous table. Arranging the 86 funds into quintiles according to the magnitude of their alphas, this table shows that expense ratios and trading costs follow a U-shaped pattern, higher for the extreme quintiles and lower in the middle quintiles. The results for funds with the highest expenses are essentially evenly divided between those that covered their costs, outperforming the market, and those that did not. In both cases, the funds' expenses were similar. The middle quintile, which contains more index funds, exposes investors to the lowest expense ratios and trading costs.

The results in Tables 2 and 3 show that more than one-half of the funds reported returns – which are measured after deducting their trading costs and expense ratio – that outperformed the market during the 11-year interval from 1998 through 2008. About two-thirds achieved Sharpe ratios exceeding that of the market portfolio for domestic equities during this 11-year period. Approximately one-half achieved a positive four-factor alpha. Table 4 shows the return characteristics of funds, arranged in quintiles according to the alphas. The funds with the highest alphas tended to have the highest exposure to overall market risks (highest beta) over the interval, mostly favoring exposure to growth stocks (see also Table 2) and underweighting slightly stocks with stronger momentum.

Over intervals as short as these 11 years, we expect to find a range of alphas within any set of funds representing diverse investment strategies. Over longer intervals, the alphas for large individual funds tend to converge to values below zero.[9] The investment strategies for half the funds in this sample produced positive alphas over these 11 years, but these same strategies will not necessarily tend to produce positive alphas over longer intervals as waves of valuations continue to shift among the various market factors, for example, when bids swing back to value stocks versus growth stocks.

**Potential Savings of ETFs and Commingled Trusts in 401(k) Plans**

Even if the domestic equity mutual funds that performed strongly in this study's sample, or other similar funds readily identifiable to 401(k) plan sponsors and participants, continue to offer attractive excess returns in the future, participants in all 401(k) plans can benefit further if

[9] See, for example, Standard & Poor's (2009), Bogle (2007), Malkiel (2007), and Boyson (2008).

their plans adopt ETFs and commingled trusts as investment options. ETFs and commingled trusts increasingly offer investment strategies that match the exposure to market factors of most types of mutual funds. The common pricing of mutual funds emphasizes an expense ratio to cover almost all costs. The pricing of ETFs and commingled trusts separates administration and investment management fees, thereby accommodating pricing structures that conform more closely to the structure of 401(k) plans' costs. Furthermore, ETFs and commingled funds offer some services more economically, particularly ETFs which can reduce the cost of trading.

ETFs and commingled trusts commonly charge investors a fee only for managing assets. ETFs and commingled trusts do not charge 401(k) plans for administering individual participants' accounts and transactions, which entail costs tied more closely to the number of participants in a plan rather than the value of assets under management. Providers that specialize in administering participants' transactions, records, and reports supply these services for per capita fees. These providers can offer economies to smaller plans by enrolling them in a common system, and by offering a common set of ETF and commingled trusts as investment options.[10] This restructuring of fees and aggregation of accounts can achieve substantial economies. Larger 401(k) plans, which use commingled trusts more than smaller plans, achieve effective expense ratios that are about 0.40 percent of assets lower than the median plan (Deloitte 2009a; HR Investment Consultants 2008; Table 1). The alignment of fees with costs also treats a plan's participants more equitably as their balances grow and can allow the entire plan to monitor and control its expenses as its aggregate balances expand.

ETFs also avoid a substantial portion of transaction cost. This study finds that median trading costs for the 100 domestic equity mutual funds that hold the largest defined-contribution plan balances are about three-quarters the magnitude of the median expense ratios, about 0.66 percent of assets. Full transaction cost, which comprises trading cost and the opportunity cost of delayed or missed trades, is likely greater than the expense ratio for these funds (Wagner 2003; Gastineau 2005; Kissell 2006). This transaction cost, directly or indirectly, reflects the price of

[10] Record keepers' aggregating the assets of many smaller 401(k) plans would allow the plans to participate in large omnibus accounts at commingled trust funds, which would lower their fees for managing their investments. Currently, mutual funds' sharing of revenues and some services with record keepers tends to discourage this use of commingled trusts and ETFs.

mutual funds obtaining liquidity when they plan to trade large volumes of securities. ETFs avoid this cost by accepting or making payments in kind from authorized participants, typically large institutional investors, instead of making trades in the market. In effect, ETFs are supplying their authorized participants a degree of liquidity, instead of paying the cost of obtaining liquidity.[11] Authorized participants possess the option to obtain or dispose of a spectrum of stocks – which they hold, purchase, or borrow – on behalf of themselves or their clients in exchange for a share in an index fund with guaranteed execution at a price known in advance. ETFs do not allow 401(k) plans to avoid all transaction costs, because plans must pay commissions when they buy or sell ETFs. Nonetheless, ETFs can reduce net transaction costs, because participants in 401(k) plans typically conduct fewer transactions than the managers of the funds in which they invest.

Commingled trusts also can achieve lower transaction costs than mutual funds. The trading activity of mutual funds reflects both external and internal transactions. Mutual funds held by 401(k) plans are shares issued against a pool of assets. These same pools frequently provide other shares to the public. Accordingly, the trading activity of a pool responds to its net cash flow, its external transactions with its entire population of shareholders, which can include investors who trade in and out of the pool more actively than its 401(k) participants. The pool's trading activity also reflects the internal transactions of its investment managers. Commingled trusts attempt to control the size and volatility of their external transactions by accepting only institutional investors who are not likely to bring a significant amount of trading activity. There is little evidence to suggest, however, that the internal trading activity by managers of commingled trusts differs significantly from that of mutual funds with similar investment strategies. Commingled trusts can avoid a substantial amount of internal transaction cost by themselves holding ETFs.

The potential saving provided by ETFs and commingled trusts are significant. The median expense ratio shown in Table 1 is near 0.80 percent of assets. Deloitte (2009a) reports that the average "all-in" fee, comprising expense ratios and per capita fees, in their survey of 401(k) plans is 0.72 percent of assets, amounting to about $350 for the median participant, who

[11] ETFs charge authorized participants for their transactions as they create or retire creation units in the fund. The prospectus for IVV provides for a fixed fee plus a "variable charge (up to 3 percent of the transaction for creations and 2 percent for redemptions) to compensate for brokerage and market impact expenses.

holds an average balance of nearly $50,000.[12] Total administration cost currently is no more than $50 per year per participant, or 0.10 percent of assets for the median participant (HR Investment Consultants 2007).[13] Commingled trusts and ETFs provide managed funds and funds with different investment styles that can replicate the investment style of many managed mutual funds. The expense ratios for these ETFs and commingled trusts can range from 0.25 to 0.40 percent of assets (Deloitte 2009b; HR Investment Consultants 2007). Consequently, these alternatives would reduce overall fees by 0.22 to 0.35 percent of assets ((0.72 – (0.10+0.40)) and (0.72 – (0.10+0.25))).

In addition to these potential savings, ETFs also can reduce transaction cost significantly. This saving is greatest for ETFs that replicate the market strategies of actively managed mutual funds. This study's estimates of median trading costs for its sample of mutual funds, 0.66 percent of assets, suggests savings in trading cost offered by ETFs near 0.50 percent of assets for active strategies. With this reduction in transaction cost plus the reduction in fees discussed above, ETFs that mirror the market exposures of actively managed equity mutual funds could reduce overall fees for participants in 401(k) plans by 0.70 percent of assets.

Participants in 401(k) plans could achieve similar reductions in fees and trading costs by shifting their assets from actively managed mutual funds to low-cost index mutual funds, index ETFs, and index commingled trusts. The investment management fee for common domestic broad market index alternatives to actively managed funds currently can be less than 0.10 percent of assets.[14] This expense plus an administration fee of 0.10 percent of assets would reduce fees and costs to no more than 0.20 percent of assets. This shift would imply a saving of about 0.50 percent of assets (0.72 – (0.10+0.10)) or more compared with the median actively managed mutual fund.

[12] The Investment Company Institute (2009b) reports that the average asset-weighted expense ratio for domestic equity mutual funds in 401(k) plans was 0.67 percentage points in 2008.

[13] This expense ratio is for plans with 50 participants. For plans with 100 participants it is $30 per participant or 0.06 percent of average assets, and continues to fall as the number of participants increases. These figures do not include separate fees to cover the cost of providing loans, withdrawals, qualified domestic relation orders, and other special services within 401(k) plans. These additional costs can be covered by additional assessments to those who request these services.

[14] The expense ratio for VTI is 0.07 percent, and that for IVV and SPY is 0.09 percent.

In summary, ETFs could contribute another 0.50 of a percentage point or more to net returns for participants in 401(k) across the spectrum of equity investment options, ranging from index funds to other investment styles. Commingled trusts offer an additional return of 0.22 to 0.35 of a percentage point for actively managed funds. Low-cost index mutual funds, index ETFs, and index commingled trusts offer an additional return of 0.50 of a percentage point for assets shifted from actively managed funds.

**Conclusion**

Mutual funds provide valuable investment options for 401(k)-type plans. On average, from 2004 through 2008, the domestic equity funds examined in this study paid, net of all fees and transaction costs, returns that were competitive with market returns given the funds' exposure to market risks. Yet, the design and pricing of mutual funds can cost the average participant 0.70 of a percentage point or more in annual returns. Much of this toll can be attributed to trading costs, which can be reduced by shifting the investment options from mutual funds to ETFs or commingled trusts that hold ETFs.

Mutual funds most often rely on an expense ratio to cover the costs of administering and managing 401(k) plans. ETFs and commingled trusts allow 401(k) plans to separate their administration costs from the cost of managing their plans' investments. This unbundling allows for greater economies of scale in the provision of services to small and medium-size 401(k) plans. Providers that specialize in administering plans for per capita fees can enroll many smaller plans in a common record-keeping system and offer a common set of ETFs and commingled trusts as investment options to achieve the economies of a very large plan. These savings can range from 0.20 to 0.35 percent of assets for the average-size 401(k) plan.

Participants in 401(k) plans also pay the trading cost incurred by mutual funds. This study estimates that the trading costs for the predominantly actively managed mutual funds in its sample are, on average, about three-quarters the magnitude of the funds' expense ratios, about 0.66 percent of assets. ETFs, by design, incur fewer trading costs. As a result, for actively

managed funds, ETFs could allow 401(k) plans to boost net returns an additional 0.50 of a percentage point.

By shifting from actively managed mutual funds to low-cost index mutual funds, index ETFs, and index commingled trusts, participants in 401(k) plans also might receive an additional 0.50 of a percentage point in returns.

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Appendix A

| Fund Name | Ticker | Total Net Assets as of 2004 | Total Net Assets as of 2008 | Defined Contribution Assets as of 2007 | Maximum Sales Charge as of 2007 | Lipper Category | Style |
|---|---|---|---|---|---|---|---|
| AIM Small-cap Growth | GTSAX | $1,500.1 | $633.3 | $1,433 | 5.50% | Small-Cap Growth Funds | Growth |
| American Funds AMCAP | AMCPX | 13,319.5 | 10,351.4 | 6,698 | 5.75% | Multi-Cap Core Funds | Core |
| American Funds Capital Income | CAIBX | 32,504.5 | 53,676.7 | 9,551 | 5.75% | Mixed-Asset Target Allocation Growth Funds | Other |
| American Funds Fundamental | ANCFX | 21,542.7 | 24,448.9 | 12,052 | 5.75% | Large-Cap Value Funds | Value |
| American Funds Growth | AGTHX | 60,323.1 | 52,596.0 | 91,149 | 5.75% | Multi-Cap Growth Funds | Growth |
| American Funds Income | AMECX | 42,535.9 | 43,360.0 | 10,469 | 5.75% | Mixed-Asset Target Allocation Growth Funds | Other |
| American Funds Investment Co. | AIVSX | 64,879.6 | 43,244.4 | 17,031 | 5.75% | Large-Cap Value Funds | Value |
| American Funds Mutual | AMRMX | 12,986.4 | 11,115.4 | 2,462 | 5.75% | Multi-Cap Value Funds | Value |
| American Funds New Economy | ANEFX | 7,151.4 | 4,328.2 | 2,086 | 5.75% | Multi-Cap Growth Funds | Growth |
| American Funds Washington | AWSHX | 63,079.5 | 38,539.1 | 19,917 | 5.75% | Large-Cap Value Funds | Value |
| Ariel Fund | ARGFX | 4,196.6 | 1,091.2 | 2,024 | -- | Mid-Cap Core Funds | Core |
| Artisan Midcap | ARTMX | 4,762.5 | 2,898.2 | 4,002 | -- | Mid-Cap Growth Funds | Growth |
| Baron Asset | BARAX | 2,376.2 | 2,273.2 | 1,491 | -- | Mid-Cap Growth Funds | Growth |
| Baron Growth | BGRFX | 4,049.0 | 4,057.6 | 3,485 | -- | Small-Cap Growth Funds | Growth |
| Baron Small Cap | BSCFX | 2,252.0 | 2,097.9 | 1,279 | -- | Small-Cap Growth Funds | Growth |
| BlackRock Basic Value | MABAX | 4,302.7 | 1,748.3 | 2,970 | -- | Large-Cap Value Funds | Value |
| BlackRock Fundamental Growth | MAFGX | 1,605.1 | 567.6 | 2,044 | -- | Large-Cap Growth Funds | Growth |
| BlackRock S&P 500 Index | MASRX | 1,662.8 | 1,041.3 | 1,783 | -- | S&P 500 Index Objective Funds | Index |
| Dreyfus Appreciation | DGAGX | 4,435.7 | 2,481.5 | 1,300 | -- | Large-Cap Core Funds | Core |
| Dreyfus S&P 500 Index | PEOPX | 3,326.7 | 1,968.1 | 2,100 | -- | S&P 500 Index Objective Funds | Index |
| DWS Dreman High Return | KDHAX | 4,364.8 | 2,245.2 | 1,491 | 5.75% | Equity Income Funds | Other |

| Fund Name | Ticker | Total Net Assets as of 2004 | Total Net Assets as of 2008 | Defined Contribution Assets as of 2007 | Maximum Sales Charge as of 2007 | Lipper Category | Style |
|---|---|---|---|---|---|---|---|
| DWS Equity 500 Index | BTIIX | 1,830.7 | 1,284.9 | 1,436 | -- | S&P 500 Index Objective Funds | Index |
| Fidelity Advisor Equity Growth | EPGAX | 1,169.2 | 618.4 | 2,281 | 5.75% | Multi-Cap Growth Funds | Growth |
| Fidelity Advisor Equity Income | FEIAX | 909.4 | 794.9 | 2,021 | 5.75% | Equity Income Funds | Other |
| Fidelity Advisor Midcap | FMCAX | 4,879.3 | 1,399.4 | 4,071 | 3.50% | Mid-Cap Core Funds | Core |
| Fidelity Advisor Small Cap | FSCDX | 462.7 | 821.1 | 1,620 | 5.75% | Small-Cap Core Funds | Core |
| Fidelity Aggressive Growth | FDEGX | 5,053.9 | 1,518.0 | 1,800 | -- | Mid-Cap Growth Funds | Growth |
| Fidelity Blue Chip Growth | FBGRX | 23,578.1 | 8,685.4 | 7,345 | -- | Large-Cap Growth Funds | Growth |
| Fidelity Capital Appreciation | FDCAX | 6,452.3 | 4,391.8 | 4,075 | -- | Multi-Cap Growth Funds | Growth |
| Fidelity Contrafund | FCNTX | 44,484.5 | 45,195.2 | 47,533 | -- | Multi-Cap Growth Funds | Growth |
| Fidelity Disciplined Equity | FDEQX | 4,951.2 | 9,080.0 | 1,512 | -- | Large-Cap Core Funds | Core |
| Fidelity Dividend Growth | FDGFX | 19,422.3 | 5,361.0 | 6,363 | -- | Large-Cap Core Funds | Core |
| Fidelity Equity Income | FEQIX | 26,371.7 | 17,311.4 | 14,104 | -- | Equity Income Funds | Other |
| Fidelity Equity Income II | FEQTX | 12,915.4 | 5,111.1 | 2,623 | -- | Equity Income Funds | Other |
| Fidelity Export & Multinational | FEXPX | 1,643.1 | 2,265.5 | 1,395 | -- | Multi-Cap Growth Funds | Growth |
| Fidelity Fund | FFIDX | 10,812.2 | 4,395.2 | 3,334 | -- | Large-Cap Core Funds | Core |
| Fidelity Growth & Income | FGRIX | 32,106.1 | 6,240.6 | 9,216 | -- | Large-Cap Core Funds | Core |
| Fidelity Growth Co. | FDGRX | 25,180.3 | 21,563.2 | 23,299 | -- | Multi-Cap Growth Funds | Growth |
| Fidelity Independence | FDFFX | 4,704.8 | 3,376.7 | 1,768 | -- | Multi-Cap Core Funds | Core |
| Fidelity Leveraged Co. Stock | FLVCX | 2,142.0 | 2,899.5 | 1,875 | -- | Mid-Cap Value Funds | Value |
| Fidelity Low-Priced Stock | FLPSX | 35,976.1 | 18,350.6 | 18,840 | -- | Mid-Cap Value Funds | Value |
| Fidelity Magellan | FMAGX | 63,295.8 | 18,948.4 | 24,625 | -- | Large-Cap Growth Funds | Growth |
| Fidelity Midcap Stock | FMCSX | 9,093.3 | 4,808.3 | 6,291 | -- | Mid-Cap Core Funds | Core |
| Fidelity OTC Portfolio | FOCPX | 8,143.5 | 3,209.3 | 4,904 | -- | Multi-Cap Growth Funds | Growth |
| Fidelity Real Estate Investment | FRESX | 4,556.6 | 2,805.9 | 1,898 | -- | Real Estate Funds | Other |

| Fund Name | Ticker | Total Net Assets as of 2004 | Total Net Assets as of 2008 | Defined Contribution Assets as of 2007 | Maximum Sales Charge as of 2007 | Lipper Category | Style |
|---|---|---|---|---|---|---|---|
| Fidelity Small-cap Stock | FSLCX | 3,741.0 | 2,623.7 | 2,516 | -- | Small-Cap Core Funds | Core |
| Fidelity Spartan 500 Index | FSMKX | 12,112.9 | 5,283.9 | 2,074 | -- | S&P 500 Index Objective Funds | Index |
| Fidelity Spartan Ext. Mkt. Index | FSEMX | 1,282.5 | 1,685.6 | 1,340 | -- | Mid-Cap Core Funds | Core |
| Fidelity Spartan Total Market Index | FSTMX | 2,774.2 | 3,932.7 | 1,655 | -- | Multi-Cap Core Funds | Core |
| Fidelity Spartan U.S. Equity Index | FUSEX | 21,084.4 | 13,814.8 | 24,535 | -- | S&P 500 Index Objective Funds | Index |
| Fidelity Value | FDVLX | 10,279.0 | 8,695.5 | 5,855 | -- | Multi-Cap Core Funds | Core |
| Franklin Balance Sheet-A | FRBSX | 4,218.6 | 2,112.8 | 2,443 | 5.75% | Mid-Cap Value Funds | Value |
| Franklin Small-Mid Cap Growth-A | FRSGX | 7,728.8 | 2,190.3 | 2,301 | 5.75% | Mid-Cap Growth Funds | Growth |
| Goldman Sachs Midcap Value | GSMCX | 708.1 | 1,688.9 | 4,145 | -- | Mid-Cap Value Funds | Value |
| Harbor Capital Appreciation-Inst. | HACAX | 6,825.2 | 5,039.3 | 3,330 | -- | Large-Cap Growth Funds | Growth |
| Hartford Capital Appreciation HLS | HIACX | 10,751.9 | 6,018.0 | 3,973 | -- | Mid-Cap Core Funds | Core |
| Hartford Midcap HLS | HIMCX | 2,193.6 | 1,552.7 | 1,534 | -- | Large-Cap Growth Funds | Growth |
| Janus Adviser Forty-S | JARTX | 1,160.1 | 1,984.1 | 2,080 | -- | Large-Cap Growth Funds | Growth |
| Janus Fund | JANSX | 13,604.1 | 7,060.9 | 1,915 | -- | Large-Cap Growth Funds | Growth |
| Janus Midcap Value-Inv. | JMCVX | 3,453.2 | 5,264.0 | 1,438 | -- | Mid-Cap Value Funds | Value |
| Janus Twenty | JAVLX | 10,081.9 | 7,046.7 | 3,407 | -- | Large-Cap Growth Funds | Growth |
| Legg Mason Value Trust-I | LMNVX | 4,402.6 | 1,348.5 | 1,645 | -- | Large-Cap Growth Funds | Growth |
| Legg Mason Value-FI | LMVFX | 872.8 | 400.3 | 1,267 | -- | Large-Cap Growth Funds | Growth |
| Lord Abbett Midcap Value-A | LAVLX | 6,354.9 | 2,111.9 | 2,876 | 5.75% | Mid-Cap Value Funds | Value |
| Lord Abbett Small-cap Value-A | LRSCX | 1,065.5 | 1,273.7 | 1,756 | 5.75% | Small-Cap Core Funds | Core |
| MFS Value | MEIAX | 3,988.2 | 4,145.5 | 1,495 | 5.75% | Large-Cap Value Funds | Value |
| Munder Midcap Core Growth | MGOAX | 52.3 | 1,318.7 | 1,240 | 5.50% | Mid-Cap Growth Funds | Growth |
| Neuberger Genesis | NBGNX | 1,539.4 | 1,391.3 | 8,152 | -- | Small-Cap Growth Funds | Growth |

| Fund Name | Ticker | Total Net Assets as of 2004 | Total Net Assets as of 2008 | Defined Contribution Assets as of 2007 | Maximum Sales Charge as of 2007 | Lipper Category | Style |
|---|---|---|---|---|---|---|---|
| Neuberger Partners | NPRTX | 1,474.8 | 1,040.3 | 1,536 | -- | Multi-Cap Growth Funds | Growth |
| Oppenheimer Capital Appreciation | OTCNX | 213.1 | 149.1 | 2,858 | -- | Large-Cap Growth Funds | Growth |
| Oppenheimer Main Street | OMGNX | 172.7 | 110.4 | 1,603 | -- | Large-Cap Core Funds | Core |
| Oppenheimer Main Street Small Cap | OPMNX | 112.7 | 195.4 | 1,525 | -- | Small-Cap Core Funds | Core |
| Pioneer Midcap Value | PCGRX | 1,724.0 | 1,015.6 | 1,880 | 5.75% | Mid-Cap Value Funds | Value |
| T. Rowe Price Blue Chip Growth | TRBCX | 7,235.8 | 6,726.9 | 5,951 | -- | Large-Cap Growth Funds | Growth |
| T. Rowe Price Capital Appreciation | PRWCX | 4,962.1 | 6,876.8 | 1,748 | -- | Mixed-Asset Target Allocation Growth Funds | Other |
| T. Rowe Price Equity Index 500 | PREIX | 4,788.7 | 7,549.8 | 1,208 | -- | S&P 500 Index Objective Funds | Index |
| T. Rowe Price Growth | PRGFX | 8,238.1 | 12,612.6 | 7,579 | -- | Large-Cap Growth Funds | Growth |
| T. Rowe Price Income | PRFDX | 16,033.7 | 12,492.0 | 7,536 | -- | Equity Income Funds | Other |
| T. Rowe Price Midcap Growth | RPMGX | 12,663.6 | 9,405.0 | 8,670 | -- | Mid-Cap Growth Funds | Growth |
| T. Rowe Price Midcap Value | TRMCX | 4,570.7 | 4,041.8 | 2,263 | -- | Mid-Cap Value Funds | Value |
| T. Rowe Price New Horizons | PRNHX | 5,740.9 | 4,055.1 | 2,806 | -- | Small-Cap Growth Funds | Growth |
| T. Rowe Price Science & Technology | PRSCX | 3,904.6 | 1,379.7 | 1,417 | -- | Science & Technology Funds | Growth |
| T. Rowe Price Small Cap | OTCFX | 6,364.3 | 3,534.5 | 3,362 | -- | Small-Cap Core Funds | Core |
| T. Rowe Price Small-cap Value | PRSVX | 4,489.3 | 3,581.2 | 2,512 | -- | Small-Cap Core Funds | Core |
| T. Rowe Price Value | TRVLX | 2,428.7 | 5,094.3 | 1,294 | -- | Multi-Cap Core Funds | Core |
| Vanguard 500 Index Signal | VIFSX | N/A | 13,098.6 | 8,460 | -- | S&P 500 Index Objective Funds | Index |
| Vanguard 500 Index-Inv. | VFINX | 84,167.1 | 38,778.1 | 20,911 | -- | S&P 500 Index Objective Funds | Index |
| Vanguard Explorer | VEXPX | 8,230.3 | 4,692.6 | 4,589 | -- | Small-Cap Growth Funds | Growth |
| Vanguard Inst. Index-Inst. Plus | VIIIX | 13,493.4 | 17,643.4 | 13,120 | -- | S&P 500 Index Objective Funds | Index |
| Vanguard Institutional Index | VINIX | 34,989.9 | 31,543.3 | 18,530 | -- | S&P 500 Index Objective Funds | Index |
| Vanguard Morgan Growth-Inv. | VMRGX | 4,563.0 | 4,114.0 | 2,917 | -- | Multi-Cap Growth Funds | Growth |
| Vanguard PRIMECAP | VPMCX | 22,998.1 | 14,688.2 | 15,191 | -- | Multi-Cap Core Funds | Core |

| Fund Name | Ticker | Total Net Assets as of 2004 | Total Net Assets as of 2008 | Defined Contribution Assets as of 2007 | Maximum Sales Charge as of 2007 | Lipper Category | Style |
|---|---|---|---|---|---|---|---|
| Vanguard PRIMECAP-Admiral | VPMAX | 4,297.8 | 7,285.8 | 2,990 | -- | Multi-Cap Core Funds | Core |
| Vanguard Total Stk. Mkt. Index-Inv. | VTSMX | 31,718.1 | 39,440.4 | 3,047 | -- | Multi-Cap Core Funds | Core |
| Vanguard Windsor | VWNDX | 16,384.7 | 6,642.7 | 7,210 | -- | Multi-Cap Value Funds | Value |
| Vanguard Windsor II-Admiral | VWNAX | 5,554.4 | 10,778.0 | 5,551 | -- | Large-Cap Value Funds | Value |
| Vanguard Windsor II-Inv. | VWNFX | 29,015.9 | 18,229.1 | 12,761 | -- | Large-Cap Value Funds | Value |
| Vantagepoint Growth | VPGRX | 2,999.8 | 1,426.7 | 2,021 | -- | Multi-Cap Growth Funds | Growth |
| Victory Diversified Stock-A | SRVEX | 2,036.6 | 2,765.6 | 1,492 | 5.75% | Large-Cap Core Funds | Core |
| Wells Fargo Small-cap Value-Z | SSMVX | 1,374.3 | 1,435.6 | 1,250 | -- | Small-Cap Core Funds | Core |
| **TOTAL** | | $1,184,508 | $875,606 | $649,806 | | | |

Table 1. *Distribution of Trading Cost by Quintiles*

By Total Trading Cost

| **Quintile** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| Turnover Ratio | 7% | 36% | 45% | 50% | 79% |
| | -------- Percent of Total Net Assets ------- | | | | |
| Total Trading Cost (TC) | 0.11 | 0.39 | 0.66 | 1.15 | 1.99 |
| Brokerage Commissions | 0.01 | 0.07 | 0.12 | 0.10 | 0.17 |
| Bid-Ask Cost | 0.01 | 0.03 | 0.03 | 0.04 | 0.07 |
| Price Impact Cost | 0.06 | 0.29 | 0.50 | 0.97 | 1.69 |
| Annual Sales Load Fee (SLF) | 0.10 | 0.12 | 0.08 | 0.06 | 0.09 |
| Exp Ratio (ER) | 0.35 | 0.69 | 0.82 | 0.96 | 0.91 |
| TC+ER+SLF | 0.39 | 1.26 | 1.59 | 2.05 | 3.25 |

By Total Net Assets

| **Quintile** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| Median assets (millions) | $3,008 | $4,880 | $7,501 | $12,957 | $44,796 |
| Turnover Ratio | 41% | 59% | 42% | 37% | 23% |
| | -------- Percent of Total Net Assets ------- | | | | |
| Brokerage Commissions | 0.12 | 0.13 | 0.11 | 0.07 | 0.05 |
| Bid-Ask Cost | 0.04 | 0.05 | 0.03 | 0.03 | 0.02 |
| Price Impact Cost | 0.48 | 0.97 | 0.38 | 0.43 | 0.37 |
| Total Trading Cost | 0.71 | 1.15 | 0.55 | 0.56 | 0.41 |
| Annual Sales Load Fee (SLF) | 0.14 | 0.02 | 0.11 | 0.04 | 0.14 |
| Exp Ratio (ER) | 1.12 | 0.87 | 0.85 | 0.72 | 0.58 |
| TC+ER+SLF | 2.07 | 1.93 | 1.65 | 1.41 | 1.27 |

*Source:* Authors' estimates using NYSE TAQ, CRSP, Lipper, and Thomson-Reuters data.

The top panel organizes the 100 domestic equity mutual funds in quintiles according to their median total trading cost for the period 2004 through 2008. The bottom panel organizes the funds according to their median assets. The entries for annual sales load fee show the mean cost for the funds in each quintile. The entries for all other costs in each panel show the median value for each cost for the funds in the quintile. For each fund, each cost is the median value for that cost for 2004 through 2008.

Table 2. *Mutual Fund Performance by Size and Style*

| **Quintile** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| All Funds | | | | | |
| Median assets (millions) | $3,070 | $5,621 | $7,827 | $16,181 | $59,802 |
| Sharpe Ratio | 0.0341 | 0.0565 | 0.0220 | 0.0060 | 0.0368 |
| Alpha | 1.37% | -0.23% | 0.45% | -0.07% | 0.41% |
| Turnover Ratio | 41% | 25% | 42% | 30% | 25% |
| Index Funds | | | | | |
| Median Assets | $3,228 | $5,162 | $12,957 | $42,387 | $107,000 |
| Sharpe Ratio | -0.0252 | -0.0299 | -0.0225 | -0.0200 | -0.0213 |
| Alpha | 0.25% | 0.06% | 0.36% | 0.44% | 0.38% |
| Turnover Ratio | 7% | 6% | 5% | 7% | 6% |
| Core Funds | | | | | |
| Median Assets | $3,008 | $5,003 | $7,230 | $11,080 | $29,031 |
| Sharpe Ratio | 0.0527 | 0.0475 | -0.0009 | 0.0613 | 0.0144 |
| Alpha | 1.39% | 0.40% | -0.66% | 0.18% | 0.87% |
| Turnover Ratio | 33% | 16% | 46% | 57% | 16% |
| Value Funds | | | | | |
| Median Assets | $4,167 | $7,827 | $16,781 | $35,648 | $77,338 |
| Sharpe Ratio | 0.0749 | 0.0777 | 0.0104 | 0.0539 | 0.0129 |
| Alpha | -1.79% | 0.76% | -0.26% | -0.36% | 0.53% |
| Turnover Ratio | 61% | 42% | 26% | 27% | 18% |
| Growth Funds | | | | | |
| Median Assets | $2,988 | $5,566 | $7,501 | $11,287 | $35,804 |
| Sharpe Ratio | 0.0220 | 0.0679 | 0.0220 | 0.0715 | 0.0403 |
| Alpha | 1.37% | 2.68% | 0.36% | 0.96% | 1.72% |
| Turnover Ratio | 41% | 78% | 53% | 39% | 45% |

| Quintile | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Other | | | | | |
| Median Assets | $5,706 | $7,185 | $16,019 | $42,133 | $69,062 |
| Sharpe Ratio | 0.0344 | 0.0794 | 0.0049 | 0.0138 | 0.1103 |
| Alpha | -2.98% | 0.00% | -0.39% | -0.51% | 0.65% |
| Turnover Ratio | 46% | 22% | 72% | 28% | 24% |

*Source:* Authors' estimates using CRSP, Thomson-Reuters, and Fama-French data.

For each style, the table organizes the relevant subset of the sample of 86 funds into quintiles by their median total net assets. The entries show the median characteristic for the funds in each quintile. For each fund, the value of assets and the turnover ratio is the median value for each for the years 2004 through 2008.

Table 3. *Distribution of Performance, Fees, and Costs*

| Quintile | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Alpha | -2.10% | -0.30% | 0.36% | 1.37% | 4.44% |
| | | -------- Percent of Total Net Assets ------- | | | |
| Total Trading Cost (TC) | 0.82% | 0.53% | 0.19% | 0.53% | 0.81% |
| Annual Sales Load Fee (SLF) | 0.11% | 0.06% | 0.07% | 0.14% | 0.09% |
| Exp Ratio (ER) | 0.84% | 0.61% | 0.54% | 0.76% | 0.89% |
| TC+ER+SLF | 1.86% | 1.19% | 1.04% | 1.44% | 1.92% |

*Source:* Authors' estimates using NYSE TAQ, CRSP, Thomson-Reuters, and Fama-French data.

The Table organizes the sample of funds into quintiles by their value of alpha. The entries for annual sales load fee show the mean cost for the funds in each quintile. The entries for all other costs show the median for each cost for the funds in each quintile. For each fund, each cost is the median value for that cost for years 2004 through 2008.

Table 4. *Distribution of Alpha and Exposure to Market Factors*

| Quintile | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Alpha | -2.10% | -0.30% | 0.36% | 1.37% | 4.44% |
| Beta | 0.981 | 0.971 | 0.970 | 0.989 | 1.171 |
| Small Cap | 0.275 | -0.071 | -0.145 | -0.074 | 0.089 |
| Value | 0.461 | 0.163 | 0.026 | -0.030 | -0.230 |
| Momentum | 0.180 | 0.084 | -0.028 | 0.044 | -0.015 |

*Source:* Authors' estimates using CRSP, Thomson-Reuters, and Fama-French data.

The Table organizes the sample of funds into quintiles by their value of alpha. The entries for beta and the other market factors show the median value of each for the funds in each quintile.

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