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ABSTRACT

We report experimental results that shed light on the demand for high-fee mutual funds. Wharton MBA and Harvard College students allocate $10,000 across four S&P 500 index funds. Subjects are randomized among three information conditions: prospectuses only (control), summary statement of fees and prospectuses, or summary statement of returns since inception and prospectuses. Subjects are randomly selected to be paid for their subsequent portfolio performance. Because payments are made by the experimenters, services like financial advice are unbundled from portfolio returns. Despite this unbundling, subjects overwhelmingly fail to minimize index fund fees. In the control group, over 95% of subjects do not minimize fees. When fees are made salient, fees fall, but 85% of subjects still do not minimize fees. When returns since inception (an irrelevant statistic) are made salient, subjects chase these returns. Interestingly, subjects who choose high-cost funds recognize that they may be making a mistake.

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> "S&P 500 index funds are mutual funds whose goal is to mirror the return of the S&P 500 index. The underlying portfolios of these funds are similar to commodities because they hold essentially identical portfolios of securities. However, like many other end-products that are based on commodities, S&P 500 index funds themselves are not commodities. These funds differ from one another through the services that are packaged with their securities portfolios and through other characteristics. Differences in services and characteristics allow mutual funds to appeal to the needs of a wide range of investors."
>
> Sean Collins, Investment Company Institute (2005, p. 2)

Mutual fund fees vary by an order of magnitude across firms even though the industry has hundreds of competing firms. Moreover, there is scant evidence that more expensive funds pick stocks well enough to offset their fees (e.g. Carhart, 1997; Gruber, 1996).[1] Some authors have argued that investors should not choose high-fee funds, particularly in the index fund market, where the underlying portfolio is a commodity (Elton, Gruber, and Busse, 2004). Industry trade groups have responded by arguing that variation in services, such as financial advice or complementary investment instruments, explains the variation in fees (Collins, 2005). Academic economists have explained the demand for high fee funds with search cost models (Sirri and Tufano, 1998) and models that combine search costs and services (Hortaçsu and Syverson, 2004).

We report experimental results that shed light on these theories of the demand for high-fee mutual funds. In our primary experiment, we give subjects four S&P 500 index fund prospectuses and ask them to allocate $10,000 among these funds. To make choices incentive-compatible, we randomly select subjects who will receive the next year's return from their hypothetical portfolio (if that return is positive).[2] The selected subjects do not actually make investments in their chosen funds. Hence, subjects' returns are *unbundled* from any non-portfolio services provided by the mutual fund companies.

Subjects who are only given the four prospectuses—the control condition—choose portfolios with an average fee that is only slightly below the average fee of the four index funds. Over 95% of control group subjects fail to minimize fees.

[1] Wermers (2000) finds that high turnover funds—which tend to charge higher fees—outperform low turnover funds after expenses if one does not adjust for beta, size, momentum, and value effects. However, he does not perform a comparable analysis that sorts directly on expenses instead of turnover.

We test the role of search costs by eliminating them in one of our experimental treatments. In this transparency treatment, subjects receive the four fund prospectuses as well as a one-page sheet that summarizes the four index funds' fees. The fee summary sheet causes investments to shift toward lower-cost index funds relative to control subjects who received only the fund prospectuses. However, over 80% of these fee transparency treatment subjects *still* fail to minimize index fund fees.

In a second treatment, subjects receive the four prospectuses and a summary sheet that shows each index fund's annualized returns since *inception*. Because each fund's inception date differs, this information should be ignored when predicting across-fund variation in future fund returns. In fact, we construct our fund menu so that annualized returns since inception are *positively* correlated with fees; chasing past returns since inception lowers expected future returns. Nevertheless, this is what our subjects do.

Our experimental subjects are probably better-equipped than most investors to make sophisticated investment decisions. The bulk of the participants are elite MBA students at Wharton. The remaining subjects are college students recruited on the Harvard campus. Our MBA subjects report an average combined SAT score of 1453, which is at the 98th percentile nationally, and our college subjects reported an average score of 1499, which is at the 99th percentile.[3] When we measure financial literacy directly, we find that these subjects are more knowledgeable than the typical American investor.

We also report results from a second experiment that has a similar structure and yields similar results. In this experiment, the four funds in the investment menu are actively managed small cap value funds. In this experiment, there were only two groups of subjects, the control group (subjects receive only the prospectuses) and the fee transparency treatment (subjects receive the prospectuses and a sheet summarizing mutual fund fees). The subjects in this experiment are elite college, law, and MBA students enrolled at the University of Pennsylvania.

These experiments lead us to the following description of mutual fund investing:

1) **Many people do not realize that mutual fund fees are important in making an investment decision**. Therefore, it is unlikely that their search effort is directed towards

[2] If the return is negative, no payments are made.

[3] These averages are consistent with the school-wide statistics publicly reported by the universities. See http://www.collegeboard.com/prod_downloads/about/news_info/cbsenior/yr2005/02_v&m_composite_percentile_ranks_0506.pdf for percentile rankings of combined SAT scores.

finding fees. In our index fund experiment, college students in the control group ranked fees as only the eighth most important factor in their decision out of eleven factors. Their mean fee was 122 basis points above the possible minimum. In the actively managed fund experiment, expense ratios were also ranked eighth by the control group, whose mean fee was 56 basis points above the possible minimum.

2) **The subset of investors that realizes fees are important often cannot accurately identify the fee information in the prospectus.** The MBAs in the index fund experiment control condition ranked fees as the most important factor in their decision. However, despite the disparity in how the MBA and college students ranked the importance of fees, the MBAs' average fee was only 10 basis points below the college students' average, a statistically insignificant difference.
3) **Making fee information transparent reduces allocations to high-cost funds.** In both the index fund experiment and the actively managed fund experiment (where higher fees could signal greater stock-picking skill), subjects in the fee transparency treatment selected lower-cost portfolios than control subjects. Fee transparency caused MBA portfolio fees to drop more than college portfolio fees, consistent with MBAs' placing more importance on fees. Making fees transparent also causes subjects to report that fees are more important.
4) **Even when fee information is transparent, investors do not invest in the lowest-fee fund.** In the index fund experiment, providing the fee summary sheet does not drive the chosen portfolios to the minimum-cost boundary, even among the MBAs. Therefore, search costs alone do not fully account for the willingness to hold high-fee index funds. Subjects instead seem to value non-fee attributes of index funds. However, in our experiment, services should not matter, since the subjects do not receive any services. For example, subjects may be attracted by brand names, even when the brands are stripped of any service differential.
5) **Investors are swayed by salient but irrelevant returns information.** Providing the returns summary sheet to index fund experiment subjects caused them to chase historical returns. College subjects responded more to the returns summary sheet than the MBAs, consistent with college students' placing more importance on past returns. Because we had selected funds such that annualized returns since inception were positively correlated

with fees, returns-chasing behavior decreased expected returns. The historical returns of funds are the focus of much mutual fund advertising and media coverage (Jain and Wu (2000), Sapp and Tiwari (2004), Cronqvist (2004), Mullainathan and Shleifer (2005)).

6) **Investors in high-cost index funds have some sense that they are making a mistake.** In the index fund experiment, higher fees are paid by subjects who report having less confidence that their choice is optimal for them, a higher likelihood of changing their portfolio in response to professional investment advice, and less general investment knowledge.

Our results support a growing body of evidence that individual investors may not be well-equipped to make optimal asset allocation choices in the current regulatory environment (see, for example, Benartzi and Thaler, 2001; Cronqvist and Thaler, 2004; Choi et al., 2004; Cronqvist, 2004; Barber, Odean and Zheng, 2005; Brown, Liang and Weisbenner, 2006). Our results have several public policy implications. First, policymakers should not assume that investors are sufficiently fee-sensitive to generate strong competitive pressure in the domain of mutual fund fees. Second, it may be useful to create incentives for intermediaries, such as 401(k) plan providers and state 529 college-savings plan administrators, to respond to mutual fund fees, since many individual investors are not doing so themselves. Third, our results suggest that the current prominent disclosure of historical returns information may inhibit optimal portfolio choice. Finally, policymakers should consider not only *what* information is disclosed, but also *how* it is disclosed. If important information such as a fund's expense ratio and load were required to be made salient/transparent, rather than being buried in a prospectus, we anticipate that there would be an aggregate reallocation of assets towards low-cost funds. This, in turn, would generate pressure for high-fee funds to lower their fees. Of course, such a measure would not have its desired effect if funds remain free to hide their fees in other ways, such as soft-dollar agreements with their brokers.[4]

The paper proceeds as follows. Section I describes the design of our primary experiment using S&P 500 index funds. Section II discusses the results from this experiment. Section III

[4] In a soft-dollar agreement, a mutual fund will overpay its broker for trades in exchange for a kickback. We thank Gideon Saar for bringing this issue to our attention.

discusses the design and results from the experiment using actively managed funds. We conclude in Section IV.

Section I. S&P 500 Index Fund Experiment Design

During the summer of 2005, we recruited MBA students at Wharton and college students at Harvard for the index fund experiment.[5] We paid the MBA students $20 and the college students $5 for participating in the experiment. In addition, we entered subjects into a lottery, described in greater detail below, for which there was one winner on each campus. All subjects could also receive an additional future payment contingent upon choices in an unrelated experiment run immediately after ours. (See Ericson (2005) for a description of this concurrent experiment.) We randomly assigned subjects to a control group or one of two treatment groups.

All subjects received a packet containing an investment choice sheet (reproduced in Appendix A) and photocopies of four S&P 500 index funds' prospectuses.[6] Prospectuses are often the only document sent to potential investors requesting information about a fund.[7] The choice sheet was one page long and had three sections. The first section explained the purpose of the experiment: to allocate $10,000 among the four S&P 500 index funds. It also told subjects that one participant would be selected at random to win any positive return his or her chosen allocation earned from September 1, 2005 through August 30, 2006. That is, if the value of the winning participant's portfolio exceeded the $10,000 initial investment at the end of this period, the winner of the lottery would receive a payment equal to the value of the portfolio on August 30, 2006 minus the initial investment of $10,000. If the value of the winning participant's portfolio fell short of the initial $10,000 investment, the winner would receive nothing but would also not be responsible for the loss. The second section gave a numerical example of how this prize would be calculated. The third section contained a matrix in which participants entered

[5] The MBA students were mostly first-year students recruited during their pre-term orientation. Therefore, they had received very little MBA coursework at the time of the experiment. Nonetheless, our point stands that this highly selected group is very sophisticated relative to the typical individual investor.

[6] PDF copies of the prospectuses used in the experiment are available at http://www.som.yale.edu/faculty/jjc83/research.html.

[7] We had a research assistant pose as a potential investor and call a dozen companies' customer service numbers to ask for material that would be useful for deciding whether to invest in the companies' S&P 500 index funds. Our research assistant's conversation with the Morgan Stanley representative was particularly amusing. He was told, "There are better S&P 500 index funds out there… There's no question that Vanguard's fund will outperform ours… Do not buy our S&P 500 index fund. It will not accomplish anything. I wouldn't be able to look at myself in the mirror in the morning if I recommended that fund to you."

their investment allocation. Participants were told they could allocate their investment across as many or as few funds as they desired, subject to two constraints: (1) they had to allocate exactly $10,000 in total, and (2) they had to satisfy the minimum opening balance requirement for any fund to which they made an allocation. We imposed the latter restriction to mimic the constraints that an investor would face when making a real investment in these funds. The minimum opening balance for each fund was listed next to the column where participants were to write their selected allocation.

The first of the two treatment groups received a one-page "fee sheet" (reproduced in Appendix B) in addition to the choice sheet and prospectuses. The fee sheet explained that mutual funds charge fees, showed how to calculate the impact of loads and expense ratios on portfolio value, and listed the expense ratio, load, and dollar cost of the expense ratio and load for a one-year $10,000 investment in each of the four funds participants could select. All of the fee sheet information was contained in the prospectuses. If subject choices in the control condition reflect optimal utilization of all relevant information in the prospectuses, then this treatment should have no effect on portfolios.

The second treatment group received the prospectuses, the choice sheet, and a one-page "returns sheet" (reproduced in Appendix C) listing the annualized returns since inception net of fees, expenses, and loads for each of the four funds. The funds' inception dates were listed on the sheet, as well as the standard disclaimer, "Past performance is no guarantee of future results." All funds in the experiment listed their annualized returns since inception in the prospectus. There is extensive evidence that mutual fund investors chase past returns (Hendricks, Patel, and Zeckhauser (1993), Ippolito (1992), Sirri and Tufano (1998), Chevalier and Ellison (1997)), but the rationality of such behavior is a subject of debate (Gruber (1996), Carhart (1997), Zheng (1999), Sapp and Tiwari (2004)). In the case of S&P 500 index funds, however, variation across funds in annualized returns since inception is driven almost entirely by the S&P 500's performance over the lifetime of the funds, and thus should be ignored when predicting future relative returns. Our experiment provides new evidence on returns-chasing rationality by varying exposure to a particular type of historical return information that should have *no* effect on fund allocation decisions.

Subjects in all three groups were given as much or as little time as they wanted to make their investment allocations. They were not allowed to confer with each other while making their

choices. When participants had completed their investment allocation, they returned all of the materials in their packet and were given a three-page debriefing survey to complete (reproduced in Appendix D). The survey asked for some demographic information. It also asked participants how important various factors were in their investment decision, how long they had looked at the prospectuses, and how confident they were that the investment allocation they had chosen was optimal for them. Finally, it asked a series of questions designed to assess the participants' financial literacy. These questions were modeled after those asked in the widely cited John Hancock Eighth Defined Contribution Plan Survey (John Hancock Financial Services (2002)). Thus, we are able to compare our subjects with John Hancock's representative sample of individuals between the ages of 25 and 65 who contribute money to a retirement savings plan and have some choice of investment options in the plan. After returning the debriefing survey, the experiment ended.

We chose the four funds included in the experiment to satisfy the following criteria: (1) they sought to mimic the returns of the S&P 500 index, (2) they were front-end load funds with wide variation in the total fees charged, (3) they reported annualized returns since fund inception in their prospectus, (4) annualized returns since inception was positively correlated with fees, and (5) their prospectus was available as a PDF document online.

We focus on S&P 500 index funds because we can rank this universe normatively. Returns before fees are nearly identical across these funds, so the dominant driver of net return variation is the loads and expenses that the funds charge. Because the winning experimental subject would not be making actual investments in the funds, non-portfolio considerations like the fund's customer service, tax exposure, or the waiver of loads when purchasing the fund family's other funds should be irrelevant.[8]

We wanted wide variation in the fees charged by the funds we offered so that subjects' decisions would meaningfully affect their expected returns. The largest source of S&P 500 index fund fee variation is their loads, which vary in the CRSP mutual fund database from 0% to 5.75% of invested funds. There is also substantial variation in annual expense ratios, which vary

[8] We did not explicitly state that the lottery winners' payout would be based on the before-tax return of their portfolios. However, funds with higher returns since inception will tend to have a higher exposure to capital gains taxes. Since funds with high returns since inception tend to have higher fees in our experiment, subjects believing we would replicate the after-tax fund returns should still choose the lowest-fee fund, which also had the lowest annualized returns since inception. In the historical data, the high-fee Mason Street and Morgan Stanley funds had

from 6 to 200 basis points. We restricted the set of funds under consideration to those with loads because we did not want to confound sensitivity to total fees with sensitivity to the mere presence of a load.[9] We opted to include only front-end load funds because back-end loads are calculated as a percent of assets at the time of sale. Therefore, a back-end load does not have a predetermined nominal dollar value, making it hard to summarize using dollar units.

By requiring that our funds be less than 10 years old, we ensure that their prospectuses will report annualized returns since inception. Because we wanted to distinguish irrational returns-chasing behavior from rational fee-avoiding behavior, we searched for a fund menu where fees were positively correlated with annualized returns since inception.

Finally, we restricted the set of S&P 500 index funds to those with a PDF prospectus available online. Although most mutual fund companies post their fund prospectuses on the Internet, many are in HTML format only. Printing these HTML files resulted in many formatting problems on the hard copies, such as page breaks in the middle of tables. We did not want the graphical polish of a prospectus to unduly influence subject choices. Furthermore, we did not want to reformat the HTML prospectuses because we wanted subjects to see the information provided by the mutual fund companies in the way that the companies had intended.

After imposing the above criteria, the set of suitable S&P 500 index funds was remarkably small. The four funds we selected are the Allegiant S&P 500 Index Fund, the Mason Street Index 500 Stock Fund, the Morgan Stanley S&P 500 Index Fund, and the UBS S&P 500 Index Fund. For all four funds, we specified that subjects could only invest in the Class A shares.[10] The funds, their ticker symbols, minimum opening balance requirements, fees, and annualized returns since inception net of fees, expenses, and loads are listed in Table 1. These numbers are all taken from the most recent prospectuses available at the time of the experiment, which list returns through December 31, 2003.

The expense ratio across the four funds varied from 0.59% to 0.80%, and the load varied from 2.50% to 5.25%.[11] The total annual fee (expense ratio plus front-end load) on a $10,000

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the highest capital gains distributions and the low-fee UBS and Allegiant funds had the lowest capital gains distributions.

[9] Barber, Odean, and Zheng (2005) argue that mutual fund investors are more sensitive to loads than expense ratios.

[10] Many mutual funds provide different classes of shares. Some share classes will charge a lower fee for investments that exceed a certain threshold, typically much higher than the $10,000 hypothetical investment that could be made in this experiment. Other share classes are differentiated by charging either a front-end or a back-end load.

[11] The expense ratio associated with each of these funds is not unambiguous because all four funds have in the past waived part of their stated expenses on an ad hoc basis each year. In this paper, we use the expense ratio from the

investment held for one year varied from a low of $309 for the Allegiant fund to a high of $589 for the Morgan Stanley fund.[12] Although the Allegiant fund is the lowest-cost fund, the total fee for the UBS fund is only $11 more. The other two, the Mason Street and Morgan Stanley funds, have substantially higher loads and expense ratios.

The annualized returns since inception across the four funds varied from a low of 1.3% for the Allegiant fund to a high of 5.9% for the Mason Street fund. Although all four funds were established during a 19-month window, the S&P 500 Index level ranged from 757 at the Mason Street fund's inception to 1047 at the Allegiant fund's inception. This variation in the S&P 500 Index value at inception is largely responsible for the differences in the reported returns since inception. The four funds' contemporaneous returns after expenses differ by no more than 35 basis points in any year from 1999 to 2003 (the lowest-cost fund, Allegiant, always has the highest return), and the difference in loads—225 basis points at most—is amortized over at least five years of fund existence when calculating annualized returns since inception. Note that the fund with the highest annualized returns since inception (the Morgan Stanley fund) is one of the two high-cost funds, whereas the fund with the lowest reported returns since inception (the Allegiant fund) is the lowest-cost fund.

Section II. S&P 500 Index Fund Experiment Results

A. Subject Characteristics

As noted earlier, the majority of the participants in the index fund experiment were either Wharton MBA students or college students recruited on the Harvard campus. Although we aimed to recruit only MBA subjects on the Wharton campus, we did not explicitly prohibit non-MBA students from participating in the experiment, and our Wharton campus subject pool included 15 college students and two economics Ph.D. students.[13] We conduct our analyses for both the full sample of participants across the two campuses and for two separate subgroups. Because we believe the differences between undergraduate and graduate students are more

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prior year after any expense waivers, as stated in the prospectus, unless the fund guarantees the waiver level in the following year. This net-of-waiver expense ratio is what Morningstar reports and uses to rate funds. See Christoffersen (2001) for a discussion of mutual fund fee waivers.

[12] We calculate expenses on a $10,000 investment with the formula ($10,000 × (expense ratio + load)) for simplicity, since that was the total fee implicitly presented to subjects in the fees treatment condition. Calculating expenses using the formula ($10,000 × load) + ($10,000 × (1 – load) × expense ratio) yields almost identical results for all of the paper's analyses.

[13] We confirmed the Wharton student affiliations by checking their school-issued identification cards.

significant than the differences between the undergraduate student populations across the two university campuses, we group the 248 MBA subjects with the two economics Ph.D. students and refer to them collectively as the "MBA sample." We group the 15 college students on the Wharton campus with the 72 subjects at the Harvard campus and refer to them collectively as the "college sample."

Table 2 gives summary statistics on our subject pool. The majority of both the college and MBA samples is male, although the gender imbalance is greater among the MBAs. The "college" sample includes a few high school students who were taking summer school classes on campus, as well as a few college graduates. Both MBAs and college subjects report extraordinarily high average SAT scores (the 98th and 99th percentiles, respectively). They are also more financially literate than the typical American investor sampled in the John Hancock Defined Contribution Plan Survey (John Hancock Financial Services (2002)). Only 8% of John Hancock respondents knew what kinds of assets a money market fund holds, versus 15% of our college subjects and 40% of our MBA subjects.[14] John Hancock respondents on average thought that the stock of their own company was *less* risky than an equity mutual fund; on a 5-point scale, the average risk rating was 3.1 for employer stock and 3.6 for an equity mutual fund. In contrast, all six of our subsamples (one control and two treatment groups for the MBA and college samples) on average rated a typical Fortune 500 stock as *more* risky than an equity mutual fund. (This second comparison is potentially confounded by the fact that John Hancock respondents were asked about their own employer, whereas our subjects were asked about a random large company.) Through the luck of the draw, control group MBAs are less financially knowledgeable than other MBAs when judged by their knowledge of what a money market fund's investments are. We will show in Section II.C that our treatment estimates are robust to controlling for this difference.

MBAs reported spending 11 to 14 minutes on average reading the prospectuses.[15] These figures are close to those calculated from our own records of how much time elapsed between a subject's receiving the experimental materials and his or her returning them to receive the debriefing survey. College subjects reported spending 8 to 11 minutes on average reading the prospectuses. Unfortunately, we did not keep our own records of how much time Harvard

[14] The correct answer is short-term U.S. government bonds.

subjects took, so we cannot independently corroborate their reports. Subjects in both control groups report spending more time reading the prospectuses than the treatment groups, which is sensible given that they received only the prospectuses and neither summary sheet. As a whole, these numbers alleviate concerns that subjects simply randomized without exerting any mental effort when making their allocations. The average time spent reading the prospectuses should be enough for a knowledgeable subject to find the expenses in the four documents. Since participants could leave the experiment at any time they wished, time spent in the experiment likely reflects time actually spent in the decision-making process. Additional evidence against the randomization hypothesis comes from Wald tests, which can reject equality of subjects' mean allocations to each fund at the 1% level for all six experimental subgroups.

B. Main Portfolio Results

Table 3 shows the mean portfolio fee (load plus expense ratio) paid in each condition by subject type, as well as the average (weighted by dollar allocation) annualized returns since inception of the funds in the portfolios. For the pooled sample, the average fee paid in the control condition is \$424.[16] This is only slightly below the \$443 fee subjects would have paid if they had chosen randomly and much higher than the \$309 fee they would have paid if they had allocated all \$10,000 to the lowest cost Allegiant fund. Contrary to our expectations, MBAs do no better than college students when simply provided with the mutual fund prospectuses. MBAs in the control condition paid \$421 in fees on average, which is only \$10 less than the average college control fee, and we cannot reject the hypothesis that the means are equal (one-sided $p = 0.25$). The first two series in Figure 1 show the average control group allocations across the four funds. Both the MBAs and college students allocated 19% of their money to the lowest cost fund, and about 60% of their money to the two low-cost funds combined. The remaining 40% is allocated to the two high-cost funds.

The second row of Table 3 shows that providing the fee summary sheet lowers the average fee paid by \$55 for MBAs and \$21 for college students. This drop is significant at the

[15] When a subject reported a range of time, such as "10 to 15 minutes," we assigned the midpoint of that range to the subject.

[16] Approximately one-third of the MBAs and one-sixth of the college sample reports not having taken the SAT. Many of these subjects may be foreign students, which raises the concern that poor English skills or unfamiliarity with U.S. financial institutions may cause them to pay high fees. However, we find no significant difference in mean portfolio fees paid by subjects who did and did not take the SAT (one-sided *p*-value of 0.27, not reported in a table).

1% level for the MBAs, but the one-sided *p*-value is only 0.15 for the college sample, both because of the smaller sample size and the smaller magnitude of the effect.[17] The fee sheet effect is significant at the 1% level when the two samples are pooled together. It seems that the MBAs' sophistication manifests itself in their greater responsiveness to useful information. Nonetheless, even MBAs usually do not use the information optimally. The last two series in Figure 1 show a shift to the lowest-cost fund for the fees treatment groups relative to the control groups. But the MBAs in the fees treatment group still allocate 20% of their assets to the two high-cost funds, whereas the fees treatment college students allocate 37% to the two high-cost funds.

Figure 2, which graphs the MBA and college student fee distributions in the control and fees treatment conditions, shows that only 19% of MBA subjects and 10% of college subjects under the fees treatment allocate all of their money to the lowest-cost fund, thus paying the minimum $309 in fees. While these proportions are higher than the 6% of MBA controls and 0% of college controls who allocated all their money to the cheapest fund, they are far from the 100% one would expect under optimal choice. This result suggests that search costs alone cannot explain the tendency to invest in high-fee index funds, since the fee sheet brings these search costs close to zero. Instead, subjects seem to either misunderstand what they are getting in exchange for higher fees[18] or value normatively irrelevant characteristics. For example, subjects may be swayed by the differences in returns since inception across the funds (see below), or subjects may value diversification among different S&P 500 index funds, even though such second-order diversification benefits are much smaller in this case than first-order fee effects.[19]

The third row of Table 3 shows portfolio statistics for subjects who received the summary sheet containing returns since inception for the four funds. The returns sheet causes MBAs to shift their portfolios towards funds with higher returns since inception; the average returns since inception rise from 3.06% in the control group to 3.53%, a difference that is significant at the 1% level. The college sample responds even more strongly to the irrelevant information in the returns sheet; average returns since inception for this group increase from 2.86% to 4.03%, a change that is also significant at the 1% level. Because we had constructed the fund menu so that

[17] In case subjects misunderstood the experiment's reward scheme and believed that we would not deduct the funds' sales loads from their portfolios, we also compared the average expense ratios between the control and fees treatment groups and found the mean to be significantly lower in the pooled fees treatment group than the pooled controls.

[18] This could include a misperception about the extent of active management in an index fund.

fees would be positively correlated with returns since inception, subjects reduce their future returns by chasing past returns. The MBA returns sheet group paid $19 more in fees on average than the MBA control group, while the college returns sheet group paid $55 more than the college control group. Figure 3 compares the average allocation to each fund in the returns sheet condition to that in the control condition. The fraction invested in the Mason Street fund, which has the highest annualized returns since inception, rises from 23% to 35% among the MBAs and from 17% to 48% among the college subjects. The proportion of subjects allocating all their money to Mason Street rises from 5% to 14% among the MBAs and from 0% to 11% among the college subjects (not graphed). Again, the sophistication of the MBAs manifests itself in their response to additional information; in this case, MBAs responded less to the irrelevant returns information than college subjects.

B. Interpreting the Portfolio Results

In order to gain insight into what motivated subjects' decisions in the three experimental conditions, we asked them on the debriefing survey (Appendix D) to rate how important eleven factors were in shaping their final portfolio. We assign the integers 1 through 5 to the five possible ratings, with 1 corresponding to "not very important at all" and 5 corresponding to "very important." Table 4 reports the average integer rating of each factor's importance with the associated ordinal ranking in parentheses (lower numbers indicate a higher rank).

The college control group ranked fund performance over the past year and fund performance since inception as the first- and second-most important factors respectively. Factors other than the first-ranked past-year performance must have played a significant role, since choosing the fund with the highest performance over the past year would have led subjects to invest exclusively in the lowest-cost fund, Allegiant. The desire to diversify among funds is ranked as the third-most important factor. Given that the four funds hold approximately the same portfolio of stocks, this suggests that subjects are misapplying a diversification heuristic (Benartzi and Thaler (2001)). Consistent with their reported diversification motive, 53% of the college control group allocated some money to all four funds. Of the eleven factors, fund fees, expenses, and loads were ranked eighth, behind brand recognition and just ahead of the fund's

[19] The fee effects are likely to dominate because the pre-fee returns of the different S&P 500 funds are almost perfectly correlated.

customer service (which is irrelevant for a hypothetical investment). In light of this ranking, it seems unlikely that college subjects' search efforts were directed towards finding the most relevant information about the funds—their cost—contrary to the assumptions of a classical rational search model.

In contrast, MBA control subjects rank fees as the most important factor in their portfolio decision. As noted above, however, their fees are no lower on average than fees of the college control subjects. The negligible difference in average fees between the MBA controls and the college controls suggests that the cost of finding fees in the prospectuses may be significant for many MBAs. In addition, the high-fee portfolios chosen by the MBAs may reflect the false allure of past returns since inception—ranked third in importance by the MBA controls—which happen to be positively correlated with fees in our experiment. MBAs put less weight than college subjects on the past one-year return, which is genuinely useful information.

Providing the summary sheets elevated the importance ranking of the information provided on the summary sheet. In the fees treatment condition, college subjects rank fees as their most important factor (versus eighth for the control group); in the returns condition, they rank returns since inception as their most important factor (versus second for the control group). MBAs in both the control and fees treatment conditions rank fees as their most important factor. However, MBAs in the fees condition assign a higher absolute score to fees than MBAs in the control condition. In the returns condition, MBAs rank the two past performance factors first and second, while fees rank third (versus first for the control group).

These factor rankings appear to contain real information: subjects who rank fees highly do in fact choose portfolios with lower fees, and those who rank returns highly choose portfolios with higher past returns (and higher fees). Table 5 presents results from a set of univariate regressions of fees and returns since inception on the integer ranking of the eleven factors (each cell has coefficient estimates from a separate regression). The results must be interpreted with caution because it is not clear that the rating units are comparable across individuals, nor that the distance between adjacent categories is always equal. Nonetheless, the regressions indicate that under this coding, those who rated fees as a more important driver of their decision paid significantly less in fees (the first, third and fifth columns in Table 5), whereas those who rated returns since inception as more important chose portfolios with significantly higher returns since inception (the second, fourth and sixth columns in Table 5).

The treatment effects we observe are consistent with the summary sheets' lowering search costs for subjects who value low fees and high past returns. The more one values an attribute, the greater one's choices shift when information precision about that attribute increases. MBAs place relatively high value on low fees, and college subjects place relatively high value on high past returns. Therefore, MBAs respond more to the fees summary sheet, and college subjects respond more to the returns summary sheet. These search cost effects may be augmented by implicit advice effects, which cause subjects to infer that the information on the summary sheet is normatively important simply because it has been given to them by the experimenters.

C. Portfolio Choices and Subject Characteristics

In this section, we examine how subject characteristics affected their portfolio choices. We first consider the impact of basic demographic characteristics. Table 6 regresses portfolio fees and returns since inception on gender, years of education, and SAT scores, as well as a set of treatment dummies, a college sample dummy, and interactions of the treatment dummies with the college sample dummy. Note that adding SAT scores to the regression reduces our sample by more than half due to non-response and the number of subjects who have never taken the SAT. We find no significant demographic effects on fees paid after controlling for MBA status and treatment group effects. These weak demographic effects may be due to sample selectivity. The students in our sample have been selected to have a very narrow (and high) range of ability by admissions offices using more data than we have. A sample that was randomly selected from the U.S. population is likely to have more variation in ability that is predictable by demographics.

In addition to the basic demographic characteristics discussed above, the debriefing survey completed by respondents also included questions designed to gauge financial knowledge and investment confidence. The first and fourth columns of Table 7 show the distribution of responses to the questions about the likelihood of changing one's decision in response to professional advice, confidence that one's decision was optimal, self-assessed investment knowledge, and the types of investments found in a money market fund. Note that the MBAs score more highly on investment confidence and both the objective and self-assessed measures of financial knowledge.

Table 8 uses either probit or ordered probit regressions to examine the relationship between greater knowledge or confidence and the demographic, treatment, and sample control variables used in Table 6. Across the measures of self-assessed knowledge and confidence, college subjects and females were often significantly less confident.[20] No other variable shows a significant effect in more than one specification. When investment knowledge is objectively measured through the money markets question, the only significant effect is a negative coefficient on the female dummy, but this occurs only in the subsample that reports SAT scores. In Table 6, we saw that although college subjects and women pay higher fees on average, this difference is not statistically significant.

Although there is no relationship between demographic characteristics and portfolio fees, there is a relationship between the financial knowledge and investor confidence measures and fees. The second and fourth columns of Table 7 report, for each response to these questions, the average portfolio fee paid. Strikingly, the fees are generally decreasing in self-assessed confidence or knowledge as well as in objectively measured knowledge. For example, in the MBA sample, the average fee decreases monotonically from $439 to $356 with the level of confidence elicited by the question, "How confident are you that the decision you made is the right one for you?" The subjects who pay the highest fees themselves doubt that they are making the best portfolio allocation. There are two instances of non-monotonicity. The first is among college subjects when reporting their confidence in the optimality of their decision: those who report being "very confident" pay more than those who report being "relatively confident." However, there are only four "very confident" college subjects, so the non-monotonicity here is likely due to noise. The second instance is among the 15 MBAs who consider themselves to be "very knowledgeable" investors. These MBAs pay a higher average fee than all other MBAs except for the 15 least confident.

Table 8 documents a correlation between demographic characteristics and the answers to these knowledge and confidence questions. To see if demographic characteristics can account for the relationship between fees paid and knowledge/confidence, Table 9 regresses portfolio fees on both demographics and knowledge/confidence. The knowledge and confidence measures are

[20] See Niederle and Vesterlund (2005) for experimental evidence documenting greater overconfidence in men than women.

coded with integers that increase in knowledge/confidence.[21] Even after controlling for demographic, treatment, and sample effects, higher knowledge and confidence measures are generally associated with lower fees. The effects, however, are only statistically significant in the larger sample that includes non-respondents to the SAT question. We also see that the fees treatment effect remains statistically significant and comparable in magnitude to the estimates in Table 6 after controlling for differences in financial knowledge and investment confidence.

A final metric collected in the debriefing survey was time spent looking at the prospectuses. As reported in Table 2, subjects spent 8 to 14 minutes on average looking at the prospectus. Table 10 presents the results of regressing time spent looking at the prospectuses on demographics, the financial knowledge and investment confidence measures, and treatment group and sample dummies. College subjects spent 4 to 5 fewer minutes looking at the prospectuses than the MBAs. Among the MBAs, those in both treatment groups spent 2 to 4 fewer minutes looking at the prospectuses than did the MBA controls. In most specifications, the treatment effects on time spent is greater in magnitude among college subjects, but the difference is not statistically significant. College students spent 2 fewer minutes reading the prospectuses for every year they had been in school.[22] There is no significant effect of SAT scores, investment knowledge, or likelihood of changing one's portfolio upon receiving advice, but subjects who were more confident about the optimality of their decision spent more time reading the prospectuses. The causality of this last effect is, of course, quite likely to run in the other direction.

Table 11 shows that each minute spent reading the prospectus reduced portfolio fees by a little more than 2 basis points. However, the interaction of the fees treatment dummy with time spent reading the prospectuses indicates that in the fees treatment, spending more time reading the prospectus yielded no reduction in fees. In fact, the point estimates indicate that time spent reading the prospectus slightly increases fees paid. This makes sense, since all the information needed to minimize fees was contained in the fee sheet. Reading the prospectus was likely to confuse the subject and lead him or her astray. For example, reading the prospectus might cause subjects to place greater weight on the irrelevant variation in returns since inception. An

[21] The self-reported variables are coded from responses to multiple-choice questions that had three or five possible answers. Each possible answer was assigned an integer from 1 to 3 or 1 to 5, with higher numbers corresponding to greater knowledge, greater confidence, and less likelihood of making a change if an advisor had been consulted.
[22] Almost all of the variation in the years of education variable comes from college subjects.

alternative interpretation is that fees treatment subjects who were initially more skeptical about the sufficiency of fees alone for making the optimal investment choice were likely to spend more time reading the prospectus.

Section III. Small Cap Value Fund Experiment

Because most mutual funds are actively managed, we ran a similar experiment in Spring 2004 using four actively-managed small cap value funds in the investment menu.[23] The subjects in this experiment were 36 law, MBA, and undergraduate students enrolled in a class at the University of Pennsylvania. Table 12 describes the four mutual funds in this experiment: the American Express Small Cap Value Fund, the Columbia Small Cap Value Fund, the Morgan Stanley Small-Mid Special Value Fund, and the Scudder Small Company Value Fund. All four funds charged front-end loads for their Class A shares, which were the share classes made available to subjects. Total fees for a one-year $10,000 investment ranged from $664 for the Morgan Stanley fund to $746 for the Scudder fund. We did not attempt to create a positive correlation between past returns and fees in this experiment. In fact, the correlation between past one-year returns and fees is –0.73, so returns-chasing will tend to lower portfolio fees.

As in the index fund experiment, no formal time constraints were placed on the subjects, and one subject was randomly chosen to receive any profit his or her portfolio realized in the ensuing year.[24] In contrast to the index fund experiment, this experiment had no returns treatment condition.

Even though the normative ranking of funds in the active-management universe is not as clear as in the passive-management universe, it appears that making fee information salient has a similar effect on investor choices in both realms. This suggests that subjects in the control condition are not optimally using fee information to make their choices. Table 13 shows the mean portfolio fee (load plus expense ratio) paid by subjects in the control and fees treatment conditions. In the control condition, the average fee is $720. This is exactly equal to the fee subjects would have paid if they had randomly chosen portfolios and is much higher than the $664 fee they would have paid if they had allocated all $10,000 to the lowest cost fund, Morgan

[23] Chronologically, this experiment was run before the index fund experiment.
[24] For this experiment, the year-long time period for the calculation of the "prize" has expired. The winner selected a portfolio which declined in value over the year. The subject was reminded of his/her participation in the experiment

Stanley. Those in the fees treatment group chose portfolios with lower fees—$705—but this is still much higher than the minimum possible fee. The difference relative to the control group, $15, is significant at the 5% level in a one-sided test. Given possible differences in expected returns across these actively managed funds, it is more difficult to say whether paying these higher fees in the treatment condition was rational.

Figure 4 shows the mean portfolio share invested in each fund for the control and fees treatment groups. In the control group, the lowest cost fund—Morgan Stanley—accounts for 25.0% of total assets, whereas the highest cost fund—Scudder—accounts for 24.2% of total assets. Relative to the control group, participants in the fees treatment group allocated 18.9 percentage points more to the lowest-cost fund and 9.2 percentage points less to the highest-cost fund. Figure 5 shows the distribution of total fees (load plus expense ratio) in the control and fees treatment group portfolios. As expected given the results in Figure 4, the fee distribution shifts to the left for the fees treatment group. Table 14 shows that both groups reported in their debriefing forms that past fund performance over a longer horizon than one year was the most important factor in their portfolio choice. However, treatment subjects ranked expense ratios as the third most important factor in their decision, whereas control subjects ranked expense ratios a distant eighth. No other questions were asked on the debriefing form of this experiment.

IV. Conclusion

When consumers in a commodity market observe prices and quality with noise—even noise that has thin tails—substantial increases in competition will only weakly reduce markups (Gabaix, Laibson, and Li, 2005). In this paper, we present two experiments that suggest that investors as sophisticated as Wharton MBA students exhibit such confusion in the mutual fund market.

Our experiments exogenously manipulate the transparency of mutual fund fees and the salience of past returns without changing the total body of information available to investors. In our main control condition, subjects review four S&P 500 index fund prospectuses and allocate $10,000 across those funds. Subjects are randomly selected to be paid for their subsequent portfolio performance. Because payments are made by the experimenters, investment company

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following this period and informed that his/her portfolio had declined in value over the year, resulting in no prize payout.

services like financial advice are unbundled from portfolio returns. Despite this unbundling, 95% of subjects fail to minimize index fund fees. These results imply that many investors do not understand the importance of mutual fund fees or the nature of index funds. Even subjects who claim to understand the importance of fees nevertheless show minimal sensitivity to the fee information in the prospectus.

In a treatment condition, we make fee information transparent. This reduces allocations to high-cost funds, but 85% of investors still fail to minimize index fund fees. Subjects apparently base their choices on other normatively irrelevant mutual fund attributes. For example, making index fund returns since *inception* salient leads investors to chase these statistics (cf. Choi et al., 2004). However, our survey evidence reveals that investors in high-cost index funds *do* sense that they may be making a mistake.

Our debriefing survey indicates that our subjects are significantly *more* sophisticated than the typical American household that is contributing to a retirement account. But our subjects' extra sophistication does not translate into normatively desirable asset allocation choices. Of course, our subjects are not the *most* sophisticated investors. It is likely that some highly motivated or highly trained investors—particularly high net worth investors—are more financially sophisticated than Wharton MBA students. Indeed, investors are probably financially "sophisticated" on a dollar-weighted basis. But welfare calculations are usually weighted by person, not by net worth.

Policymakers commonly regulate the form of price disclosure. For example, most U.S. states have unit pricing laws that require grocery stores to show customers the price-per-unit-weight or the price-per-unit-volume to facilitate comparisons across products. In a similar vein, the Securities and Exchange Commission (SEC) regulates mutual fund prospectuses to facilitate comparisons across funds. Our results indicate, however, that current regulations may not obtain their intended result. First, mutual fund investors may not see the fees, which are now published inside a complex prospectus. Second, even investors that *do* see the fees may not know how to use them in forming their portfolios. Our experiment studies a pure commodity case where investors underweight the fee, even when it is made transparent and thrust into the spotlight. We do not think that our results should be interpreted to suggest that disclosure is useless. Making fee information transparent did lower subjects' portfolio fees. However, more research is required to find ways to make disclosure more effective.

Finally, our results suggest a way out of the revealed preference tautology. Standard economic methodology rules out optimization errors by assumption: any observed action must maximize utility. We show that subjects who pay higher fees tend to be less sure that they are maximizing their own utility. Developing reliable ways of eliciting agents' confidence in their *own* actions may prove to be a fruitful way of identifying the areas in which optimization errors play an economically important role. Math students can roughly predict when they may have gotten an answer wrong on an exam. Our evidence suggests that economic agents also know when they probably made an error in a utility maximization problem. Unfortunately, knowing that your choice is wrong does not necessarily tell you how to fix it.

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TABLE 1. Index Fund Experiment: Fund Characteristics

Mutual fund	Ticker symbol	Inception date	Minimum opening balance	Expense ratio[a]	Front-end load	Approximate fee on one-year $10K investment	Average annual returns since inception[b]
Allegiant/Armada S&P 500 Index Fund-Class A	AEXAX	Oct. 15, 1998	$500	0.59%	2.50%	$309	1.28%
Mason Street Index 500 Stock Fund-Class A	MISAX	Mar. 31, 1997	$1,000	0.80%	4.75%	$555	5.90%
Morgan Stanley S&P 500 Index Fund-Class A	SPIAX	Sep. 26, 1997	$1,000	0.64%	5.25%	$589	2.54%
UBS S&P 500 Index Fund-Class A	PSPIX	Oct. 2, 1998	$1,000	0.70%	2.50%	$320	2.54%

Source: Mutual fund prospectuses and authors' calculations. The prospectuses, which were the most up-to-date available at the time of the experiment, show returns data through year-end 2003.

[a] After fee waivers

[b] After fees, expenses, and sales loads, but before taxes

TABLE 2. Index Fund Experiment: Participant Characteristics

	MBA sample			College sample		
	Control group	Fee treatment	Returns treatment	Control group	Fee treatment	Returns treatment
Average age	27.7	27.4	27.4	21.0	22.0	21.0
Percent male	63%	66%	70%	50%	48%	63%
Highest education						
Some high school	0%	0%	0%	0%	7%	4%
High school grad	1%	0%	0%	7%	3%	4%
1 year of college	0%	0%	0%	13%	7%	15%
2 years of college	0%	0%	0%	20%	31%	33%
3 years of college	1%	0%	0%	50%	38%	26%
College graduate	98%	100%	100%	10%	14%	19%
SAT score						
Average verbal	714	717	719	759	760	741
Average math	730	741	737	752	752	730
Did not take SAT	30%	35%	33%	20%	17%	11%
Do not remember	23%	15%	14%	7%	10%	11%
Do not wish to answer	2%	7%	5%	7%	14%	18%
Avg. time reading prospectus' (minutes)	13.6	11.1	10.7	11.2	8.4	8.5
Knows what a money market fund holds	33%	42%	44%	14%	17%	14%
Average risk rating (1 to 5; higher = riskier)	34%	46%	52%	70%	52%	36%
Fortune 500 stock	3.02	3.36	3.28	3.57	3.14	2.79
Equity mutual fund	2.68	2.98	2.74	2.70	2.43	2.25
Sample Size	$N = 83$	$N = 85$	$N = 84$	$N = 30$	$N = 29$	$N = 28$

Source: Authors' calculations. SAT scores for subjects 27 or more years old are adjusted upward to reflect the April 1995 recentering of SAT scores. See http://www.collegeboard.com/sat/cbsenior/equiv/rt027027.html for the conversion table.

TABLE 3. Index Fund Experiment: Average Portfolio Fees and Returns Since Inception

	MBA sample		College sample		Pooled sample	
	Average fees	Average returns since inception	Average fees	Average returns since inception	Average fees	Average returns since inception
Control	$421	3.06%	$431	2.86%	$424	3.01%
Fees treatment	$366	2.30%	$410	2.61%	$377	2.37%
Returns treatment	$440	3.53%	$486	4.03%	$451	3.65%
t tests of equality of means (one-sided *p*-values, unequal variances)						
Control = fees treatment	0.000	0.000	0.145	0.076	0.000	0.000
Control = returns treatment	0.082	0.006	0.001	0.000	0.006	0.000
Fees treatment = returns treatment	0.000	0.000	0.000	0.000	0.000	0.000

Source: Authors' calculations. The top half of the table gives average fees on a $10,000 investment and returns since fund inception of portfolios chosen by the control and treatment groups for the MBA sample, the college sample, and the pooled sample. The bottom half of the table reports one-sided *p*-values of *t* tests for the equality of mean fees and returns since inception. The null hypothesis is listed in the first column, and each subsequent column corresponds to a different student population and variable whose equality is being tested. For example, the second column in the row containing "Control = fees treatment" reports the *p*-value for the test that the control MBA subjects paid the same average fee as the MBA subjects in the fees treatment group.

TABLE 4. Index Fund Experiment: Ranking of Factors Shaping Investment Decisions

	MBA sample			College sample			Pooled sample		
	Control	Fees treatment	Returns treatment	Control	Fees treatment	Returns treatment	Control	Fees treatment	Returns treatment
Quality of prospectus	2.27 (9)	2.46 (9)	2.65 (8)	2.75 (5)	2.93 (4)	2.96 (5)	2.39 (8)	2.58 (8)	2.73 (7)
Brand recognition	2.75 (6)	2.77 (6)	2.75 (7)	2.63 (7)	2.79 (5)	3.00 (4)	2.72 (6)	2.78 (6)	2.81 (6)
Past experience with fund companies	2.39 (8)	2.74 (7)	2.57 (9)	1.43 (11)	2.11 (9)	2.26 (8)	2.15 (9)	2.58 (8)	2.50 (9)
Fund fees, expenses, and loads	3.72 (1)	4.19 (1)	3.53 (3)	2.59 (8)	3.39 (1)	2.54 (7)	3.43 (3)	3.99 (1)	3.28 (3)
Minimum opening balance requirements	1.77 (11)	2.07 (11)	1.80 (11)	1.60 (10)	1.97 (10)	1.68 (11)	1.73 (11)	2.04 (10)	1.77 (11)
Investment objectives	3.24 (4)	3.52 (4)	3.41 (4)	3.00 (4)	2.76 (6)	2.79 (6)	3.18 (4)	3.33 (4)	3.25 (4)
Fund performance over the past year	3.54 (2)	3.73 (2)	3.78 (1)	4.17 (1)	3.17 (2)	3.54 (2)	3.71 (1)	3.59 (2)	3.72 (2)
Fund performance since inception	3.45 (3)	3.63 (3)	3.72 (2)	3.87 (2)	2.97 (3)	3.86 (1)	3.56 (2)	3.46 (3)	3.76 (1)
Fund performance over a different horizon	2.67 (7)	3.16 (5)	2.88 (5)	2.72 (6)	2.18 (8)	2.22 (9)	2.68 (7)	2.91 (5)	2.72 (8)
Customer service of fund	1.87 (10)	2.17 (10)	1.90 (10)	1.97 (9)	1.93 (11)	1.82 (10)	1.89 (10)	2.11 (9)	1.88 (10)
Desire to diversify across funds	2.89 (5)	2.73 (8)	2.78 (6)	3.33 (3)	2.76 (6)	3.39 (3)	3.01 (5)	2.74 (7)	2.94 (5)
Sample size	$N = 83$	$N = 84$	$N = 83$	$N = 30$	$N = 29$	$N = 28$	$N = 113$	$N = 113$	$N = 111$

Source: Authors' calculations. Each cell reports the average importance the factor had on the relevant subsample's investment decision, as elicited in the debriefing surveys. There were five possible responses, from "not important at all" to "very important." We assigned integers 1 through 5 to each possible response. Each factor's ordinal rank for the relevant subsample is in parentheses, with lower integers correspond to greater importance. Some factors' ratings are calculated based on slightly fewer observations due to non-response.

TABLE 5. Index Fund Experiment:
Effect of Factor Importance Ranking on Portfolio Fees and Returns Since Inception

	MBA sample		College sample		Pooled sample	
	Portfolio fees	Returns since inception	Portfolio fees	Returns since inception	Portfolio fees	Returns since inception
Quality of prospectus	0.093 (0.050)	0.071 (0.069)	-0.013 (0.067)	-0.083 (0.089)	0.079* (0.040)	0.037 (0.055)
Brand recognition	0.105* (0.044)	-0.025 (0.061)	0.131* (0.064)	0.033 (0.086)	0.113** (0.037)	-0.009 (0.050)
Past experience with fund companies	0.060 (0.041)	0.049 (0.057)	0.125* (0.061)	0.136 (0.082)	0.049 (0.034)	0.054 (0.046)
Fund fees, expenses, and loads	-0.222** (0.042)	-0.283** (0.058)	-0.170** (0.058)	-0.152 (0.079)	-0.221** (0.033)	-0.242** (0.045)
Minimum opening balance requirement	-0.032 (0.054)	-0.113 (0.074)	0.007 (0.076)	-0.021 (0.099)	-0.029 (0.045)	-0.091 (0.060)
Investment objectives	0.005 (0.039)	0.039 (0.053)	-0.057 (0.059)	-0.122 (0.077)	-0.025 (0.032)	-0.009 (0.044)
Fund performance over the past year	0.033 (0.042)	0.077 (0.057)	-0.049 (0.068)	0.008 (0.089)	0.013 (0.036)	0.060 (0.049)
Fund performance since inception	0.065 (0.040)	0.132* (0.055)	-0.005 (0.059)	0.139 (0.075)	0.046 (0.034)	0.133** (0.045)
Fund performance over a different horizon	-0.014 (0.041)	-0.006 (0.056)	0.029 (0.063)	0.000 (0.084)	-0.023 (0.035)	-0.015 (0.047)
Customer service of fund	0.084 (0.053)	0.024 (0.073)	-0.008 (0.076)	-0.132 (0.098)	0.055 (0.045)	-0.020 (0.060)
Desire to diversify across funds	0.135** (0.038)	0.060 (0.054)	0.099 (0.060)	0.029 (0.079)	0.136** (0.032)	0.058 (0.045)
Sample size	$N = 250$	$N = 250$	$N = 87$	$N = 87$	$N = 336$	$N = 336$

Source: Authors' calculations. Each cell reports the coefficient from a univariate regression of participants' portfolios fees or annualized returns since inception on participants' rating of each factor's importance in shaping their investment decision. The explanatory variables are integers from 1 to 5, where 1 corresponds to the response "not at all important" and 5 to the response "very important." Some regressions are calculated using fewer observations than reported in the last row because of subject non-response to the relevant question. Standard errors are in parentheses. * denotes significance at the 5% level. ** denotes significance at the 1% level.

TABLE 6. Index Fund Experiment:
Demographic Correlates of Portfolio Fees and Returns Since Inception

	Portfolio fees		Returns since inception	
Fees treatment	-0.544**	-0.591**	-0.754**	-1.062**
	(0.122)	(0.200)	(0.158)	(0.247)
Fees treatment × *College*	0.339	0.245	0.485	0.608
	(0.239)	(0.340)	(0.309)	(0.418)
Returns treatment	0.200	0.255	0.494**	0.422
	(0.122)	(0.197)	(0.158)	(0.243)
Returns treatment × *College*	0.364	0.423	0.670*	1.012*
	(0.243)	(0.343)	(0.313)	(0.422)
College	0.147	0.175	-0.356	-0.380
	(0.192)	(0.273)	(0.248)	(0.336)
Female	0.133	0.154	0.159	0.134
	(0.090)	(0.140)	(0.116)	(0.172)
Years of education	0.039	-0.045	-0.087	-0.200
	(0.061)	(0.083)	(0.079)	(0.102)
SAT score		-0.000		0.000
		(0.001)		(0.001)
Constant	3.499**	4.849**	4.473**	6.064**
	(1.039)	(1.846)	(1.342)	(2.273)
Sample size	$N = 336$	$N = 150$	$N = 336$	$N = 150$

Source: Authors' calculations. This table reports regressions of portfolio fees and average returns since fund inception. *Fees treatment*, *College*, *Returns treatment*, and *Female* are dummies for being in a fees treatment group, the college sample, a returns treatment group, and being female, respectively. *Years of education* is taken from subject debriefing forms. *SAT score* is the combined SAT math and verbal score reported by subjects. Standard errors are in parentheses. * denotes significance at the 5% level. ** denotes significance at the 1% level.

TABLE 7. Index Fund Experiment: Portfolio Fees and Returns Since Inception by Assessments of Investor Confidence and Knowledge

	MBA sample			College sample		
	Proportion of answers	Average portfolio fee	Average returns since inception	Proportion of answers	Average portfolio fee	Average returns since inception
Q5. *How likely is it that you would change your decision if you consulted a professional investment advisor?*						
Not at all likely	20%	$389	2.76%	6%	$395	2.60%
Somewhat likely	54%	$409	2.96%	41%	$435	3.00%
Very likely	26%	$424	3.12%	53%	$453	3.33%
Q7. *How confident are you that the decision you made is the right one for you?*						
Very confident	12%	$356	2.64%	5%	$443	3.34%
Relatively confident	47%	$384	2.98%	25%	$420	2.91%
Somewhat confident	25%	$413	2.99%	31%	$441	3.07%
Less than confident	13%	$414	2.89%	23%	$458	3.29%
Not at all confident	4%	$439	3.63%	16%	$458	3.43%
Q8. *How knowledgeable an investor do you consider yourself to be?*						
Very knowledgeable	6%	$427	3.20%	1%	$320	2.50%
Relatively knowledgeable	22%	$397	2.89%	10%	$412	2.90%
Somewhat knowledgeable	35%	$408	2.87%	24%	$430	2.95%
Less than knowledgeable	30%	$409	2.94%	28%	$432	3.09%
Not at all knowledgeable	6%	$450	3.68%	37%	$470	3.42%
Q11. *Which of the following types of investments are found in a money market fund?*						
Correct answer (short-term U.S. government bonds)	40%	$393	2.80%	15%	$442	3.24%
Incorrect answer (corporate bonds, stocks, none of the above)	60%	$420	3.06%	85%	$445	3.15%

Source: Authors' calculations. This table reports the frequency of responses to four debriefing survey questions and the average fee and returns since fund inception of those who gave each response.

TABLE 8. Index Fund Experiment: Determinants of Investor Confidence and Knowledge

	Investment knowledge		Know money markets		Confidence in decision		Less likely to change	
Fees treatment	-0.093	-0.148	0.230	0.165	0.244	0.086	0.209	0.296
	(0.163)	(0.262)	(0.200)	(0.319)	(0.165)	(0.266)	(0.175)	(0.281)
Fees treatment × College	0.033	0.368	-0.071	0.068	-0.721*	-0.334	0.121	0.326
	(0.325)	(0.453)	(0.452)	(0.595)	(0.322)	(0.447)	(0.357)	(0.495)
Returns treatment	-0.129	-0.131	0.271	-0.222	0.021	-0.109	-0.005	0.324
	(0.164)	(0.258)	(0.202)	(0.316)	(0.165)	(0.260)	(0.176)	(0.276)
Returns treatment × College	-0.110	-0.550	-0.262	0.048	-0.274	-0.356	0.043	-0.283
	(0.334)	(0.474)	(0.467)	(0.612)	(0.326)	(0.449)	(0.365)	(0.507)
College	-1.004**	-1.301**	-0.489	-0.632	-0.344	-0.552	-0.652*	-0.901*
	(0.264)	(0.376)	(0.379)	(0.495)	(0.258)	(0.359)	(0.289)	(0.407)
Female	-0.667**	-0.962**	-0.265	-0.517*	-0.461**	-0.578**	-0.610**	-0.698**
	(0.124)	(0.194)	(0.156)	(0.233)	(0.122)	(0.186)	(0.133)	(0.202)
Years of education	-0.032	-0.073	0.083	0.126	-0.012	-0.048	0.049	-0.011
	(0.085)	(0.113)	(0.129)	(0.157)	(0.083)	(0.108)	(0.091)	(0.118)
SAT score		0.000		-0.001		0.001		0.001
		(0.001)		(0.001)		(0.001)		(0.001)
Constant(s)	-2.363	-2.604	-1.746	-0.293	-2.038	-1.297	0.007	0.363
	(1.448)	(2.501)	(2.187)	(3.351)	(1.406)	(2.441)	(1.551)	(2.642)
	-1.464	-1.627			-1.257	-0.426	1.577	1.689
	(1.449)	(2.497)			(1.405)	(2.443)	(1.552)	(2.644)
	-0.510	-0.814			-0.477	0.211		
	(1.446)	(2.493)			(1.403)	(2.438)		
	0.699	0.179			0.941	1.574		
	(1.446)	(2.494)			(1.403)	(2.440)		
Sample size	$N = 336$	$N = 150$	$N = 336$	$N = 147$	$N = 336$	$N = 150$	$N = 336$	$N = 150$

Source: Authors' calculations. This table reports ordered probits and a probit predicting greater knowledge or confidence. *Investment knowledge* codes self-assessed investment knowledge. *Know money markets* is a dummy for whether the subject knew what assets a money market fund holds. *Confidence in decision* codes self-assessed confidence that the investment decision was right for the subject. *Less likely to change* codes self-assessed likelihood the subject would change his or her portfolio in response to professional advice. *Fees treatment*, *College*, *Returns treatment*, and *Female* are dummies for being in a fees treatment group, the college sample, a returns treatment group, and being female, respectively. *Years of education* is taken from the debriefing forms. *SAT score* is the self-reported combined SAT math and verbal score. Standard errors in parentheses. * denotes significance at the 5% level. ** denotes significance at the 1% level.

TABLE 9. Index Fund Experiment:
Effect of Investor Confidence and Knowledge on Portfolio Fees

Investment knowledge	-0.088*	-0.022						
	(0.044)	(0.066)						
Know money markets			-0.217*	0.007				
			(0.094)	(0.146)				
Confidence in decision					-0.075	-0.025		
					(0.043)	(0.063)		
Less likely to change							-0.134*	-0.161
							(0.068)	(0.098)
Fees treatment	-0.551**	-0.594**	-0.539**	-0.587**	-0.527**	-0.590**	-0.528**	-0.561**
	(0.121)	(0.201)	(0.122)	(0.202)	(0.122)	(0.201)	(0.122)	(0.200)
Fees treatment × *College*	0.341	0.252	0.262	0.105	0.287	0.238	0.345	0.268
	(0.238)	(0.341)	(0.239)	(0.346)	(0.240)	(0.341)	(0.238)	(0.338)
Returns treatment	0.188	0.252	0.252*	0.263	0.201	0.252	0.199	0.287
	(0.122)	(0.198)	(0.123)	(0.199)	(0.122)	(0.198)	(0.122)	(0.197)
Returns treatment × *College*	0.359	0.415	0.233	0.283	0.339	0.415	0.366	0.391
	(0.241)	(0.345)	(0.243)	(0.350)	(0.242)	(0.345)	(0.241)	(0.342)
College	0.065	0.149	0.193	0.321	0.122	0.160	0.100	0.097
	(0.195)	(0.286)	(0.194)	(0.283)	(0.192)	(0.277)	(0.193)	(0.276)
Demographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SAT control	No	Yes	No	Yes	No	Yes	No	Yes
Sample size	N = 336	N = 150	N = 336	N = 147	N = 336	N = 150	N = 336	N = 150

Source: Authors' calculations. This table reports regressions of portfolio fees. The four knowledge and confidence variables take integer values that increase with knowledge or confidence. *Investment knowledge* codes self-assessed investment knowledge. *Know money markets* is a dummy for whether the subject knew what assets a money market fund holds. *Confidence in decision* codes self-assessed confidence that the investment decision was right for the subject. *Less likely to change* codes self-assessed likelihood the subject would change his or her portfolio in response to professional advice. *Fees treatment*, *College*, and *Returns treatment* are dummies for being in a fees treatment group, the college sample, and a returns treatment group, respectively. Demographic controls are a female dummy and years of education. The SAT control is the combined SAT math and verbal score reported by the subjects. Standard errors are in parentheses. * denotes significance at the 5% level. ** denotes significance at the 1% level.

TABLE 10. Index Fund Experiment:
Determinants of Minutes Spent Looking at Prospectuses

Fees treatment	-2.478*	-4.458*	-2.477*	-2.399*	-2.626*	-2.537*
	(1.031)	(1.786)	(1.033)	(1.024)	(1.026)	(1.032)
Fees treatment × *College*	-0.989	1.453	-0.992	-0.978	-0.546	-1.096
	(2.102)	(3.111)	(2.106)	(2.103)	(2.099)	(2.104)
Returns treatment	-2.826**	-3.202	-2.824**	-3.096**	-2.810**	-2.807**
	(1.032)	(1.743)	(1.034)	(1.030)	(1.025)	(1.032)
Returns treatment × *College*	-0.984	0.467	-0.984	-0.694	-0.716	-1.038
	(2.046)	(2.988)	(2.050)	(2.053)	(2.037)	(2.046)
College	-4.438**	-5.476*	-4.417**	-4.654**	-4.219**	-4.222**
	(1.595)	(2.365)	(1.632)	(1.613)	(1.587)	(1.606)
Female	-0.485	-0.068	-0.472	-0.857	-0.159	-0.278
	(0.762)	(1.241)	(0.791)	(0.764)	(0.771)	(0.785)
Years of education	-1.515**	-1.946**	-1.515**	-1.553**	-1.514**	-1.546**
	(0.528)	(0.730)	(0.529)	(0.521)	(0.524)	(0.528)
SAT score		0.009				
		(0.007)				
Investment knowledge			0.024			
			(0.384)			
Know money markets				-0.384		
				(0.794)		
Confidence in decision					0.820*	
					(0.370)	
Less likely to change						-0.632
						(0.579)
Constant	39.448**	32.977*	39.373**	40.414**	36.500**	41.216**
	(8.956)	(16.376)	(9.053)	(8.844)	(8.997)	(9.098)
Sample size	$N = 312$	$N = 135$	$N = 306$	$N = 306$	$N = 312$	$N = 312$

Source: Authors' calculations. This table reports regressions of the number of minutes subjects reported they spent looking at the prospectuses. *Fees treatment*, *College*, *Returns treatment*, and *Female* are dummies for being in a fees treatment group, the college sample, a returns treatment group, and being female, respectively. *Years of education* is taken from subject debriefing forms. *SAT score* is the combined SAT math and verbal score reported by subjects. The four knowledge and confidence variables take integer values that increase with knowledge or confidence. *Investment knowledge* codes self-assessed investment knowledge. *Know money markets* is a dummy for whether the subject knew what assets a money market fund holds. *Confidence in decision* codes self-assessed confidence that the investment decision was right for the subject. *Less likely to change* codes self-assessed likelihood the subject would change his or her portfolio in response to professional advice. Standard errors are in parentheses. * denotes significance at the 5% level. ** denotes significance at the 1% level.

TABLE 11. Index Fund Experiment: Effect of Minutes Spent Looking at Prospectuses on Portfolio Fees and Returns Since Inception

	Portfolio fees			Returns since inception		
Fees treatment	-0.892**	-0.905**	-1.036**	-0.874**	-0.855*	-1.401**
	(0.249)	(0.250)	(0.334)	(0.332)	(0.332)	(0.434)
Fees treatment × *Time*	0.025	0.026	0.042	0.010	0.009	0.032
	(0.018)	(0.018)	(0.025)	(0.024)	(0.024)	(0.033)
Fees treatment × *College*	0.268	0.270	0.083	0.473	0.384	0.521
	(0.257)	(0.260)	(0.354)	(0.342)	(0.346)	(0.460)
Returns treatment	0.065	0.077	0.496	0.702*	0.729*	0.945*
	(0.229)	(0.231)	(0.334)	(0.306)	(0.307)	(0.434)
Returns treatment × *Time*	0.006	0.006	-0.028	-0.019	-0.021	-0.052
	(0.016)	(0.016)	(0.024)	(0.021)	(0.021)	(0.031)
Returns treatment × *College*	0.339	0.327	0.357	0.584	0.494	0.824
	(0.248)	(0.253)	(0.342)	(0.330)	(0.336)	(0.444)
College	0.073	0.075	0.068	-0.224	-0.432	-0.622
	(0.174)	(0.197)	(0.275)	(0.232)	(0.262)	(0.357)
Time spent	-0.023*	-0.023*	-0.024	-0.005	-0.007	-0.022
	(0.011)	(0.011)	(0.014)	(0.015)	(0.015)	(0.018)
Female		0.108	0.187		0.131	0.118
		(0.093)	(0.142)		(0.124)	(0.184)
Years of education		0.011	-0.097		-0.138	-0.303**
		(0.065)	(0.086)		(0.087)	(0.112)
SAT score			-0.000			0.001
			(0.001)			(0.001)
Constant	4.508**	4.290**	6.092**	3.127**	5.442**	7.630**
	(0.175)	(1.127)	(1.909)	(0.234)	(1.498)	(2.479)
Sample size	$N = 313$	$N = 312$	$N = 135$	$N = 313$	$N = 312$	$N = 135$

Source: Authors' calculations. This table reports regressions of portfolio fees and average returns since fund inception. *Time* is the number of minutes the subject reported he or she spent looking at the prospectuses. *Fees treatment*, *College*, *Returns treatment*, and *Female* are dummies for being in a fees treatment group, the college sample, a returns treatment group, and being female, respectively. *Years of education* is taken from subject debriefing forms. *SAT score* is the combined SAT math and verbal score reported by subjects. Standard errors are in parentheses. * denotes significance at the 5% level. ** denotes significance at the 1% level.

TABLE 12. Small Cap Value Fund Experiment: Fund Characteristics

Mutual Fund	Symbol	Minimum opening balance	Expense ratio[a]	Front-end load	Approximate fee on one-year $10K investment	1-year historical return[b]	5-year historical return[b]
American Express Partners Small Cap Value Fund- Class A	ASVAX	$2,000	1.60%	5.75%	$735	-19.24%	N/A
Columbia Small Cap Value Fund- Class A	CSMIX	$1,000	1.59%	5.75%	$734	-12.3%	1.73%
Morgan Stanley Small-Mid Special Value Fund- Class A	JBJAX	$1,000	1.39%	5.25%	$664	-9.23%[c]	N/A
Scudder Small Company Value Fund- Class A	SAAUX	$1,000	1.71%	5.75%	$746	-14.97%	-1.87%

Source: Mutual fund prospectuses and authors' calculations. The prospectuses, which were the most up-to-date available at the time of the experiment, were published in the second half of 2003. Except where indicated, the returns information comes from the prospectuses and are as of year-end 2002.

[a] As shown in prospectus fee tables. All funds' expenses are after fee waivers, except for the Columbia fund, whose fee table did not account for the 9 basis point fee waiver.

[b] After fees, expenses, and sales loads, but before taxes

[c] For the period May 28, 2002 (fund's inception date) through April 30, 2003, which is the only period whose return is reported in the prospectus.

TABLE 13. Small Cap Value Fund Experiment: Average Portfolio Fees

Control (N = 18)	$720
Fees treatment (N = 18)	$705
t test of equality of means (one-sided p-values, unequal variances)	
Control = fees treatment	0.0284

Source: Authors' calculations. This table reports the average fee on a $10,000 investment paid by the control and fees treatment groups, where the fund fees correspond to those found in Table 12. In addition, it presents a test of the null hypothesis that the mean fee paid by both groups is equal.

TABLE 14. Small Cap Value Fund Experiment: Ranking of Factors Shaping Investment Decisions

	Control	Fees treatment
Quality of prospectus	2.17 (7)	2.94 (8)
Brand recognition	2.78 (4)	3.31 (4)
Past experience with fund companies	1.61 (11)	2.75 (9)
Expense ratios	2.00 (8)	3.44 (2)
Minimum opening balance requirements	1.83 (10)	2.44 (10)
Investment objectives	2.83 (3)	3.31 (4)
Asset mix of the funds	2.94 (2)	3.13 (6)
Fund performance over the past year	2.78 (4)	3.44 (2)
Fund performance over a longer horizon	3.28 (1)	3.88 (1)
Customer service of fund	1.89 (9)	2.25 (11)
Desire to diversify across funds	2.67 (6)	3.06 (7)
Sample size	N=18	N=18

Source: Each cell reports the average importance the factor had on the relevant subsample's investment decision, as elicited in the debriefing surveys. There were five possible responses, from "not important at all" to "very important." We assigned integers 1 through 5 to each possible response. Each factor's ordinal rank for the relevant subsample is in parentheses, with lower integers corresponding to greater importance. Some factors' ratings are calculated based on slightly fewer observations due to non-response.

Figure 1. Index Fund Experiment: Mean Portfolio Shares in Control and Fees Treatment Groups

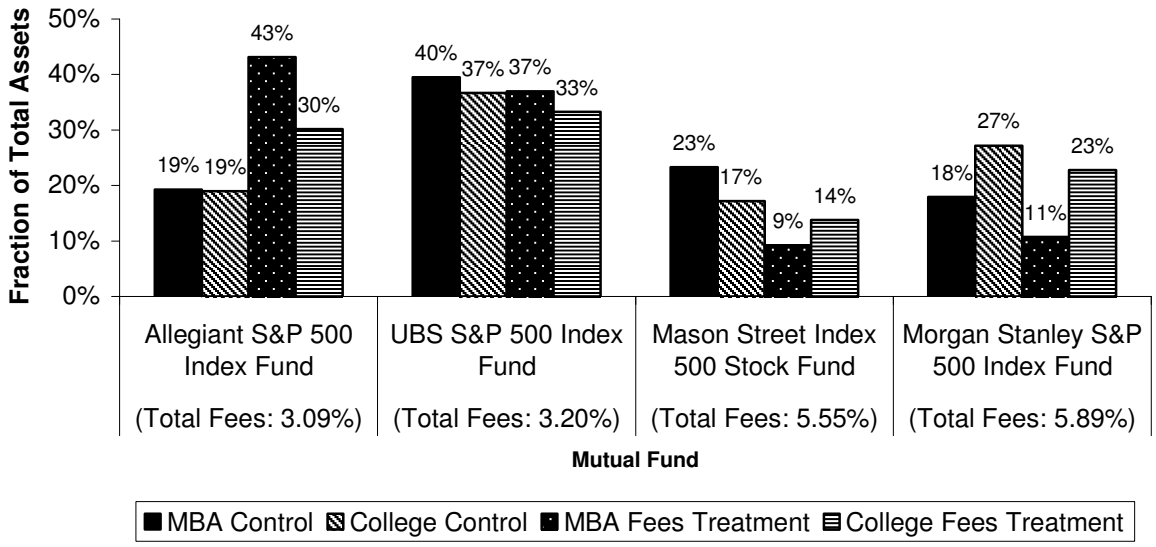

Figure 2. Index Fund Experiment: Distribution of Fees Paid in Control and Fees Treatment Groups

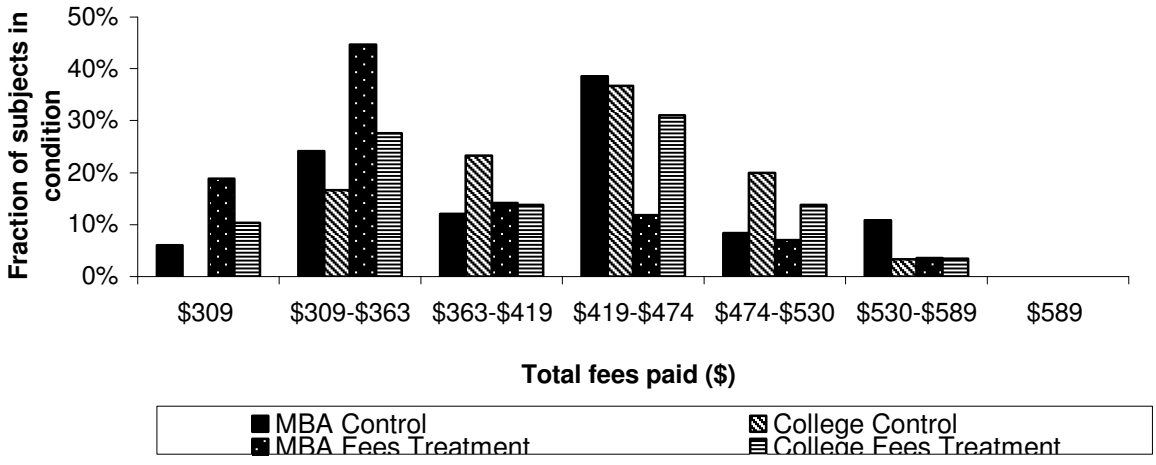

Figure 3. Index Fund Experiment: Mean Portfolio Shares in Control and Returns Treatment Groups

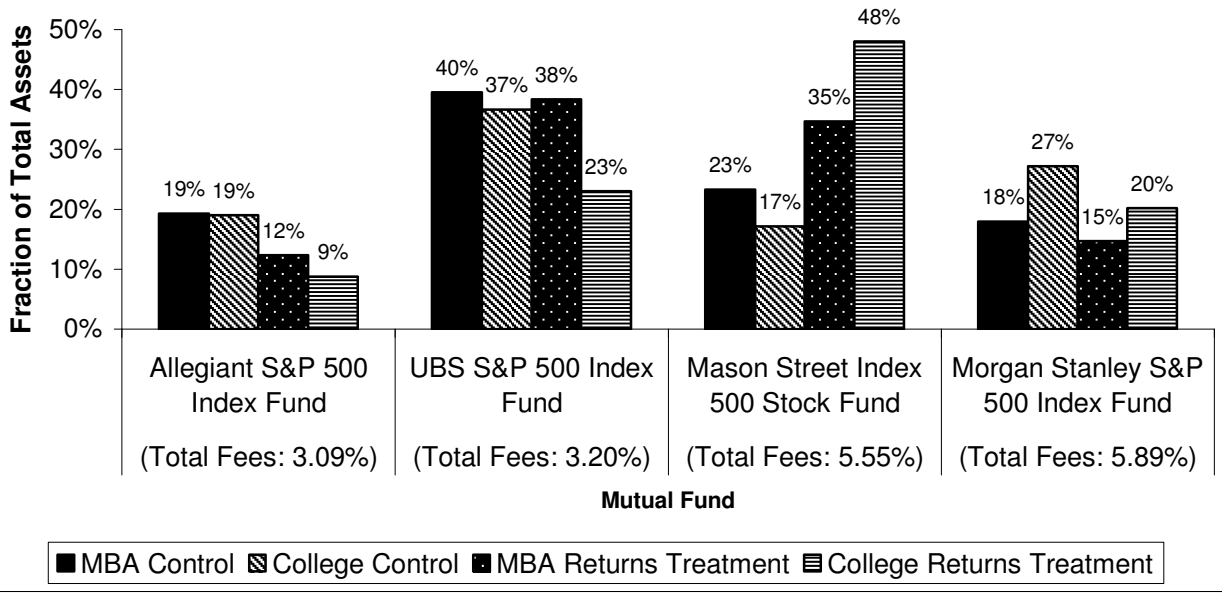

Figure 4. Small Cap Value Fund Experiment: Mean Portfolio Shares

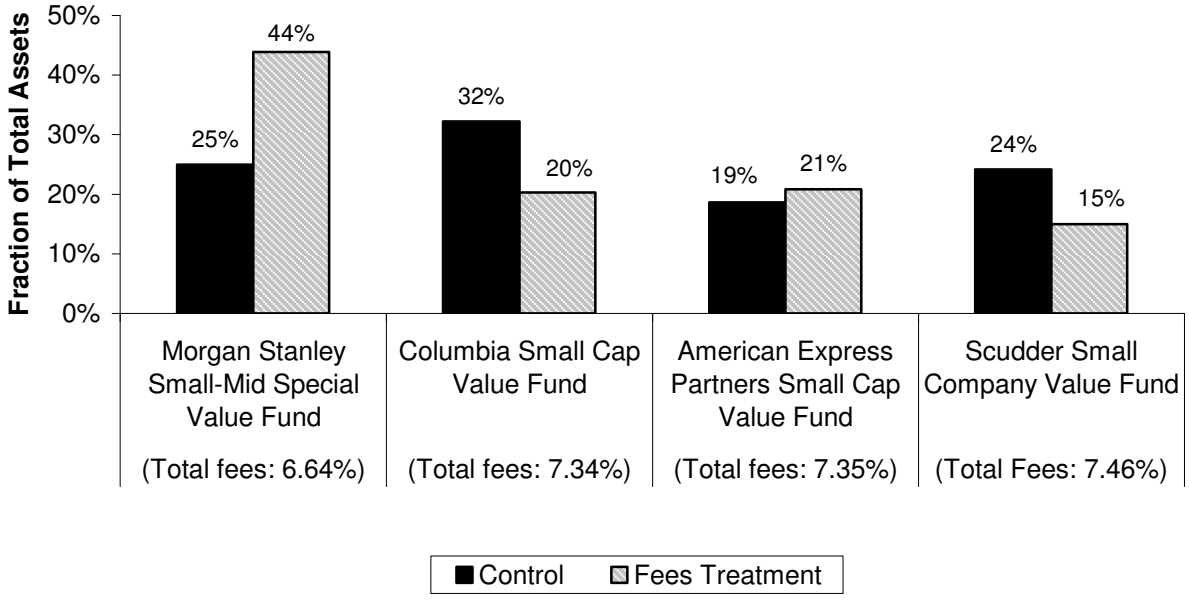

Figure 5. Small Cap Value Fund Experiment: Distribution of Fees Paid