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# WHY DOES THE LAW OF ONE PRICE FAIL? AN EXPERIMENT ON INDEX MUTUAL FUNDS

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## ABSTRACT

Experimental subjects allocate $10,000 across four S&P 500 index funds. Subject rewards depend on the chosen portfolio's subsequent return. Because the investments are not actually intermediated by the fund companies, portfolio returns are unbundled from non-portfolio services. The optimal portfolio therefore invests 100% in the lowest-cost fund. Nonetheless, subjects overwhelmingly fail to minimize fees. When we make fees transparent and salient, portfolios shift towards cheaper funds, but fees are still not minimized. Instead, subjects place high weight on normatively irrelevant historical returns. Subjects who choose high-cost index funds are relatively much less confident about their asset allocation choices.



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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 providers. There is, however, scant evidence that more expensive funds pick securities well enough to offset their higher fees (e.g. Carhart, 1997; Gruber, 1996). 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 non-portfolio 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 the results of a set of experiments that shed light on these theories of the demand for high-fee mutual funds. In these experiments, we gave 730 subjects four S&P 500 index fund prospectuses and asked them to allocate $10,000 among these funds. To make choices incentive-compatible, subjects' expected payments depended on the profits of their portfolios over a specified time period after the experimental session. We offered especially large incentives to 391 of the subjects; for them, the cost of the most expensive portfolio exceeded the cost of the least expensive portfolio by $94. Because the investments were intermediated by the experimenters (and not by the fund companies themselves), subjects' returns were completely unbundled from any fund services. Thus, we are able to identify the effect of varying fees while holding services constant—an identification that would be extremely difficult to achieve in a

non-laboratory setting. In the absence of such service effects, the optimal portfolio allocates the entire investment to the lowest-cost index fund.

Our experimental subjects may be better-equipped than most investors to make sophisticated investment decisions. Our largest subject group (which received the largest incentives) consists of Harvard staff members, who on average have many years of experience managing their personal finances. Furthermore, 88% have at least a college degree, and 60% have some graduate school education as well. Our next largest group of participants consists of MBA students from Wharton. The remaining subjects are college students recruited on the Harvard campus. Our MBA subjects reported 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.[1] When we measure financial literacy directly, we find that all three subject groups are more knowledgeable than the typical American investor.

Despite removing variation in fund services, we find that almost *none* of the subjects who received only the prospectuses minimized fees. We test the role of search costs in this failure to minimize fees by eliminating them in one of our experimental conditions. In this treatment, subjects received the four fund prospectuses as well as a one-page sheet that summarized the funds' front-end loads and expense ratios (reproduced in Appendix B).

In another treatment, we study what happens when we eliminate search costs for historical returns, as some mutual fund advertising strives to do (Jain and Wu, 2000; Sapp and Tiwari, 2004; Cronqvist, 2004; Mullainathan and Shleifer, 2005). Subjects in this condition received the four prospectuses and a summary sheet that showed each fund's historical annualized return over the longest period reported in its prospectus—usually the fund's return since inception (Appendix C). The dates over which these long-horizon historical returns are calculated differ across funds due to varying fund inception dates and prospectus publishing cycles. Thus, returns since inception should be ignored when predicting across-fund variation in future index fund returns. In fact, we constructed our fund menus so that long-horizon historical returns are positively correlated with fees; as a result, chasing past returns lowers future expected returns.

[1] These averages are consistent with the school-wide statistics publicly reported by the universities. See 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.

Finally, we study a third treatment, administered only to the Harvard staff sample, in which subjects received the four prospectuses and one page of answers to frequently asked questions (FAQs) about S&P 500 index funds (Appendix D). In particular, subjects were told that all S&P 500 index funds seek to make their pre-fee investment returns approximate the S&P 500's return. We wanted to see if supplying an explanation of what S&P 500 index funds are would drive portfolios to the lowest-cost fund.

Our results lead us to the following description of mutual fund investing. **First, many people do not realize that mutual fund fees are important for making an index fund investment decision**. Therefore, it is unlikely that their search effort is directed towards finding fees. Staff in the control condition ranked fees as only the fifth most important factor in their decision out of eleven factors, and college students in the control condition ranked fees eighth. Their mean fees were 208 and 122 basis points above the possible minimum, respectively.

**Second, even investors who realize fees are important do not minimize index fund fees.** The MBAs in the control condition ranked fees as the most important factor in their decision. Nonetheless, the MBAs' average fee was only 10 basis points below the college students' average, a statistically insignificant difference.[2] It seems that the cost of accurately finding fees in the prospectuses is relatively high for MBAs, and/or the false allure of other factors is strong enough for MBAs to offset the benefits of prioritizing fees.

**Third, making fee information transparent and salient reduces allocations to high-cost funds.** Subjects receiving the fees summary sheet selected lower-cost portfolios than control subjects. Making fees transparent also caused subjects to report that fees were more important in their portfolio decision. These shifts are consistent with investors not accurately identifying fees in mutual fund prospectuses, even when they are highly motivated like our staff subjects and only need to search over a small number of funds.

**Fourth, even when fee information is transparent and salient, investors do not come close to minimizing index fund fees.** Among those receiving the one-page fee summary sheet, 90% of staff and college students and 81% of MBAs failed to minimize index fund fees. Evidently, 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. In our experiment, non-

[2] We had to offer a slightly different fund menu to staff subjects, so MBA and staff fees cannot be compared directly.

portfolio services should not matter, since the subjects do not receive such services. Therefore, subjects must believe that some non-fee attributes predict future fund returns.

**Fifth, investors are strongly swayed by historical return information.** All subject groups ranked fund performance since inception as one of the top three factors influencing their portfolio decision. Because we had selected funds so that the longest-horizon return reported in the prospectus was positively correlated with fees, this returns-chasing behavior decreased expected returns. Eliminating search costs for long-horizon historical returns by providing the returns summary sheet caused students to allocate more money to the fund with the highest long-horizon historical return. Staff portfolios, however, did not respond to the returns summary sheet, suggesting that highly motivated investors generally find historical returns when they are given prospectuses for a small number of funds right before their investment decision.

**Sixth, investors do not understand that without non-portfolio services, S&P 500 index funds are commodities.** The fact that subjects underweight fee information and are influenced by irrelevant historical return information is strong evidence against subjects' understanding the commodity nature of pre-fee index fund returns. When we explained to staff subjects what S&P 500 index funds are in the FAQ treatment, portfolio fees dropped modestly, although the statistical significance of this drop is marginal.

**Seventh, investors in high-cost index funds have some sense that they are making a mistake.** Higher fees were paid by subjects who reported having less confidence that their choice was optimal for them, a higher likelihood of changing their portfolio in response to professional investment advice, and less general investment knowledge.

Our results add to a growing body of evidence that individual investors do not make optimal asset allocation decisions (e.g., Benartzi and Thaler, 2001; Cronqvist and Thaler, 2004; Choi, Laibson, and Madrian, 2005; Choi, Laibson, Madrian, and Metrick, 2007; Cronqvist, 2004; Barber, Odean, and Zheng, 2005). Our paper proceeds as follows. Section I describes our experimental design. Section II discusses the characteristics of our subject pool. Section III describes the main results from the experiment, and Section IV interprets the results. Section V explores the link between portfolio choices and subject characteristics. Section VI describes the results of a similar experiment we ran using actively managed funds rather than index funds. We conclude in Section VII.

## 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.[3] We recruited Harvard staff members for the experiment in the summer of 2007. We paid the MBA students a $20 participation fee, the college students a $5 participation fee, and the Harvard staff members a $10 participation fee. Subjects were also eligible for further payments that depended on their investment decisions, as described below.[4]

All subjects received photocopies of four S&P 500 index funds' prospectuses. Prospectuses are often the only document sent to potential investors requesting information about a fund.[5] Subjects also received an investment choice sheet. The investment choice sheet given to staff subjects is reproduced in Appendix A. (Materials given to student subjects were similar to the staff materials. All experimental materials, including prospectuses, may be downloaded from the first author's Website.)

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 described the payment scheme. Student subjects were told 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.[6] 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. In

[3] 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: this highly selected group is very sophisticated relative to the typical individual investor.

[4] Student subjects could also receive another future payment contingent upon choices in an unrelated experiment run immediately after ours. See Ericson (2005) for a description of this concurrent experiment.

[5] 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."

[6] There was one winner on each campus. Students on each campus were not aware that we were running sessions on the other campus.

contrast, *every* subject in the 2007 Harvard staff experiment was promised the upside return of their $10,000 portfolio, but only for the month of September 2007 rather than for a full year. This Harvard staff experiment forced us to effectively write a call option on $4 million of underlying securities, a short position that we hedged by buying calls on our own outside account. Because of the high cost of this hedge, we used an investment horizon of only one month for the staff experiment.

The second section of the choice sheet gave a numerical example of how the portfolio payout would be calculated. The third section contained a matrix in which participants entered 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 control group received only the choice sheet and prospectuses for each of the funds. The first of the three randomly selected treatment groups also received a one-page "fees sheet" (staff version reproduced in Appendix B). The fees sheet explained that mutual funds charge fees, showed how to calculate the impact of loads and expense ratios on portfolio value, and listed the load, expense ratio, and dollar cost of the load and expense ratio for a one-year $10,000 investment in each of the four funds participants could select. All of the fees sheet information was also contained in the prospectuses. If subject choices in the control condition reflect optimal utilization of all relevant information in the prospectuses, then the fees treatment group should on average select the same portfolio as the control group.

The returns treatment group received the choice sheet, prospectuses, and a one-page "returns sheet" (staff version reproduced in Appendix C) listing the annualized returns net of all fees (including the load) over the longest horizon reported in each of the four funds' prospectuses. For student subjects, these long-horizon returns were all returns since the fund's inception. For staff subjects, three of the long-horizon returns were returns since inception, and one was a ten-year return. (The reason for this discrepancy is explained later in this section.) The sheet showed the dates over which the returns were calculated, as well as the standard

disclaimer, “Past performance is no guarantee of future results.” The date ranges of the long-horizon returns varied across funds. Thus, long-horizon return variation was driven almost entirely by the S&P 500’s performance during the date range and should be ignored when predicting future relative returns. 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). Our experiment tests returns-chasing rationality by varying exposure to past return information that should have *no* effect on fund allocation decisions.

The FAQ treatment was administered only to one-quarter of the staff subjects. In addition to the choice sheet and four prospectuses, these subjects received a sheet of paper with answers to frequently asked questions (FAQs) about S&P 500 index funds (reproduced in Appendix D). The sheet addressed the following questions:

- What is a mutual fund?
- What is an S&P 500 index fund?
- What is the S&P 500 Index?

If control subjects were choosing high-cost funds simply because they did not understand that all S&P 500 index funds are seeking to imitate the same portfolio’s return, supplying this explanation may cause their portfolios to shift to lower-cost funds.

Subjects in all 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 made their investment allocation, they returned all of the materials in their packet and were given a three-page debriefing survey to complete (staff version reproduced in Appendix E). 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 offered to the student subjects to satisfy the following criteria (we will describe how we chose the funds offered to staff subjects later):

- They sought to mimic the return of the S&P 500 index
- They were front-end load funds with wide variation in the total fees charged
- They were less than 10 years old, and hence reported annualized return since fund inception in their prospectus
- Annualized returns since inception were positively correlated with fees across funds
- 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 fees the funds charge. Because subjects did not make actual investments in the funds, non-portfolio considerations like the fund's customer service or the waiver of loads when purchasing the fund family's other funds should be irrelevant.

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 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. We opted to include only front-end load funds (rather than also offering back-end load funds) in order to facilitate explaining the funds' fees on only one sheet of paper. Barber, Odean, and Zheng (2005) present evidence that mutual fund investors are more sensitive to loads than expense ratios. Therefore, subjects are likely to be *more* sensitive to our experiment's fund fees than to fees in the general index fund universe, where there are many no-load funds.

By requiring that our funds be less than 10 years old, we ensured that their prospectuses reported 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.[7] The funds, their ticker symbols, minimum opening balance requirements, fees, and annualized returns since inception net of all fees are listed in Panel A of Table 1. These numbers are taken from the most recent prospectuses available at the time of the experiment, which listed 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%.[8] The total annual fee (expense ratio plus front-end load) on a $10,000 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.[9] Though 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. All four funds were

[7] 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.

[8] 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 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.

[9] We calculate fees on a one-year $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 fees using the formula ($10,000 × load) + ($10,000 × (1 – load) × expense ratio) yields almost identical results for all of the paper's analyses. We use the formula $10,000 × (expense ratio/12 + load) to calculate fees on a one-month investment.

established during a 19-month window, but 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 return 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 return since inception (the Mason Street fund) is one of the two high-cost funds, whereas the fund with the lowest reported return since inception (the Allegiant fund) is the lowest-cost fund.

We wanted to offer the same funds to the staff subjects, who were recruited two years after the student subjects. However, the Mason Street fund was acquired by American Century Investments in 2006 and incorporated into an existing American Century index fund. Therefore, we replaced the Mason Street fund with the Phoenix Insight Index Fund, which also had high fees and historical returns. Panel B of Table 1 shows the characteristics of the funds offered to staff subjects, as listed in the most recent prospectus available at the time of the experimental sessions.

The three funds that were offered to both students and staff—the Allegiant, Morgan Stanley, and UBS funds—had similar expense ratios and front-end loads in 2005 and 2007. The total fees paid by staff subjects were generally lower, however, because their investment horizon was only one month, so they were charged for only one month of ongoing expenses rather than a full year. The liquidation of staff subjects' portfolio after one month also triggered a 1% early-redemption fee for the UBS fund, raising its cost to staff subjects relative to its cost to student subjects. Whereas the Morgan Stanley fund was the most expensive fund offered to student subjects, the Phoenix fund was by far the most expensive fund offered to staff subjects.

Because the Phoenix fund had been in operation for more than ten years at the time of the staff experiment, its prospectus did not list an annualized return since inception, but instead listed a ten-year historical return. We reported this ten-year return for the Phoenix fund on the staff subjects' fees sheet. The Phoenix fund's 7.3% ten-year return is significantly higher than the other funds' returns since inception, which are between 3.1% and 3.8%. In addition, the 16.5% one-year historical return (excluding the sales load) listed in the Phoenix fund's prospectus was

much higher than the other funds' one-year returns of around 4%. This is because the most recent prospectus for the Phoenix fund listed returns through 2006 (a good year for the market), whereas the other prospectuses only listed returns through 2005.[10]

Recall that *every* staff subject was promised the upside return on their chosen portfolio. Each staff subject was thus effectively given a call option whose strike price was $10,000 and whose underlying asset's initial value was $10,000 × (1 – portfolio load). This created large incentives for the staff subjects to make optimal choices. Based on the yield of the 30-day Treasury bill and the implied volatility given by the Chicago Board Options Exchange Volatility Index (VIX) at the close of August 21, the day before the first staff sessions began, the Black-Scholes value of allocating 100% to the Allegiant fund was $170, whereas the value of allocating 100% to the Phoenix fund was $76. Therefore, each staff subject stood to gain $94 from moving from the worst portfolio to the best portfolio.[11]

**Section II. Subject Characteristics**

As noted earlier, our subjects were Harvard staff members, Wharton MBA students, and 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.[12] Because we believe the differences between undergraduate and graduate students are more significant than the differences between the undergraduate student populations across the two university campuses, we group the MBA students with the economics Ph.D. students and refer to them collectively as the "MBA sample." We group the college students on the Wharton campus with the student subjects at the Harvard campus and refer to them collectively as the "college sample."

Table 2 gives summary statistics on our subject pools. The average staff subject is about 40 years old, which means that they typically have a couple of decades of experience managing

[10] In addition, the Phoenix fund's one-year return was inflated by a one-time payment made to the fund by the fund's former administrator. The 2006 S&P 500 return was 15.78%, in contrast to the Phoenix fund's 16.47% return. The end of the prospectus reveals in a long table that excluding the non-recurring payment, the fund's 2006 return was only 15.18%.

[11] In the end, staff subject payments due to capital gains totaled only $3,397 due to the market's performance and the high fees most subjects paid.

[12] We confirmed the Harvard staff and Wharton student affiliations by checking their school-issued identification cards.

their personal finances. As expected, the student subjects are substantially younger. The majority of our staff subjects are female, whereas both the college and MBA samples have male majorities. The staff subjects are very well-educated: 88% have at least a college degree (almost all of these are bachelor's degrees, not associate's degrees), and 60% have some graduate education or a graduate degree. 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).[13]

Every subject group is 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 21% of our staff subjects, 40% of our MBA subjects, and 15% of our college 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 ten of our experimental groups (four staff groups, three MBA groups, and three college student groups) on average rated a typical Fortune 500 stock as *more* risky than an equity mutual fund. (However, this second comparison is potentially confounded by the fact that John Hancock respondents were asked about the stock of their own employer, whereas our subjects were asked about the stock of a typical Fortune 500 company.)

Through the luck of the draw, staff subjects in the fees treatment group are younger, more likely to be female, and more educated than the other staff subjects. We will show in Section IV that our treatment estimates are robust to controlling for these demographic differences. In addition, control group MBAs are less financially knowledgeable than other MBAs when judged by their knowledge of what a money market fund's investments are. In unreported regressions, we find that controlling for whether this question was answered correctly does not qualitatively change our inference about the MBA fees treatment effect and strengthens the statistical significance of the returns treatment effect.

[13] Approximately one-third of the MBAs and one-sixth of the college sample reported 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 fees between student subjects who did and did not take the SAT (two-sided *p*-value of 0.54, not reported in a table).

Consistent with their high-powered incentives, staff subjects reported spending the most time reading the prospectuses: about 14 minutes on average. MBAs reported spending about 12 minutes reading the prospectuses, and college students reported spending about 9 minutes.[15] Students in both control groups spent more time reading the prospectuses than the treatment groups, which seems sensible given that they received only the prospectuses and neither summary sheet. This pattern is reversed among staff subjects, who spent the least time reading the prospectuses when in the control group, but the differences between the staff control group and the other staff treatment groups are not statistically significant.

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 ten experimental subgroups.

## III. Main Experimental Results

Table 3 shows the mean portfolio fee (load plus expense ratio plus short-term redemption fee) paid in each condition by subject type, as well as the average (weighted by dollar allocation) annualized long-horizon historical return of the funds in the portfolios. The average fee paid by staff in the control condition is $456, which is higher than the $431 they would have paid if they had selected randomly, and much higher than the $255 they would have paid if they had allocated all $10,000 to the lowest-cost fund, Allegiant. We cannot directly compare staff allocations to student allocations due to differing fund menus, but we can directly compare MBA and college student allocations. Contrary to our expectations, MBAs did 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

[14] The correct answer among the choices offered is short-term U.S. government bonds.

[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. The staff and MBA 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. Unfortunately, we did not keep our own records of how much time college subjects took, so we cannot independently corroborate their reports.

fee, and we cannot reject the hypothesis that the means are equal (two-sided $p = 0.52$). The fees of the average control student's portfolio are only slightly below the $443 fee subjects would have paid if they had chosen randomly and well above $309 fee of the lowest-cost fund, Allegiant.

The black bars in Figure 1 show the average control group allocations across the four funds. All three control groups allocated only 18 to 19% of their money to the lowest-cost fund, Allegiant. Staff and MBAs also had similar allocations to the Morgan Stanley fund of 18 or 19%. But staff allocated 15 percentage points less to the cheap UBS fund than MBAs because they invested 38% of their portfolio in the most expensive fund, Phoenix Insight (which was not offered to students). In contrast, MBAs invested only 23% in their costly fourth option, Mason Street (which was not offered to staff).

Comparing MBA allocations to college student allocations is more straightforward because the two groups were offered the same set of funds. Both student control groups' allocations to the two cheap funds, Allegiant and UBS, are similar—19% and about 40%, respectively. The groups' allocations differ primarily in the way they decided to allocate the portion of their portfolio devoted to expensive funds: MBAs allocated more to Mason Street than Morgan Stanley (23% versus 18%), whereas the proportions are almost exactly flipped (17% versus 27%) for the college students. The slightly lower average fee paid by MBAs is not, however, primarily driven by their relative preference for Mason Street over Morgan Stanley. The more important factor is that MBAs allocated 59% to the two cheap funds in total, whereas college students allocated a slightly lower 56%. This total is an important determinant of portfolio fees because the two cheap funds' fees are only 11 basis points apart from each other, and the two expensive funds' fees are only 34 basis points apart, but over 200 basis points separate the cheap funds from the expensive funds.

The second row of Table 3 shows that providing the fees sheet lowered the average fee paid by $24 for staff, $55 for MBAs, and $21 for college students. The drop is significant at the 5% level for the staff and the 1% level for the MBAs, but it is insignificant for the college sample, both because of the smaller magnitude of the effect and the fact that the college sample

is only a third of the size of the staff or MBA sample.[16] It seems that the MBAs' sophistication manifested itself in their greater responsiveness to useful information.

Nonetheless, most MBAs did not use the information optimally. The grey bars in Figure 1 show a shift to the lowest-cost fund for the fees treatment groups relative to the control groups. But the staff, MBA, and college subjects in the fees treatment groups still allocated 49%, 20%, and 37% of their assets to the two high-cost funds, respectively. The histograms in Figure 2 show that only 9% of staff subjects, 19% of MBA subjects, and 10% of college subjects in the fees treatment allocated all of their money to the lowest-cost fund. While these proportions are higher than the 3% of staff controls, 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 for fees alone cannot explain the tendency to invest in high-fee index funds, since the fees sheet brings these search costs close to zero.[17] Instead, subjects seem to either misunderstand what they are getting in exchange for higher fees or value normatively irrelevant characteristics.

Given the existing evidence on mutual fund returns-chasing, a likely candidate for a non-fee characteristic that subjects desire in their index funds is high past returns. The third row of Table 3 shows portfolio statistics for subjects who had normatively irrelevant long-horizon past returns highlighted to them by the returns summary sheet. The returns sheet increased returns-chasing among students. MBAs' average long-horizon historical return rose from 3.06% in the control group to 3.53% under the returns treatment, a difference that is significant at the 1% level. The college sample responded even more strongly to the irrelevant information in the returns sheet; the average return increased from 2.86% to 4.03%, a change that is also significant at the 1% level. In this case, the MBAs' sophistication manifested itself in their lower responsiveness to irrelevant information. The white bars in Figure 1 show that the Mason Street fund, which has the highest long-horizon historical return offered to students, gained portfolio share at the expense of every other fund. Because we had constructed the fund menu so that fees would be positively correlated with returns since inception, chasing past returns reduced

[16] Holding fixed the point estimate of the fee treatment effect size and the variance of subject fees, tripling the college sample size would result in the college fee treatment effect becoming significant at the 10% level.
[17] The fees summary sheet did not contain information on the UBS fund's early-redemption fee, although it did warn subjects, "Other fees may apply. Please check the fund's prospectus for more details." Even without the early-redemption fee, however, the UBS fund was more expensive than the Allegiant fund, so a cost-minimizing investor's decision would not be affected by ignorance of the early-redemption fee.

expected future returns. The MBA returns treatment group paid $19 more on average than the MBA control group, while the college returns treatment group paid $55 more than the college control group.

On the other hand, the returns sheet had no effect on staff. Staff in the returns treatment chose portfolios with an insignificantly lower average historical return than staff in the control condition. We will discuss in Section IV a potential explanation for why the returns sheet affected students but not staff.

The possibility that subjects are confused about the nature of S&P 500 index funds motivated our final treatment condition, in which subjects were given a page with answers to frequently asked questions about S&P 500 index funds. The fourth row of Table 3 shows portfolio statistics for staff subjects in this treatment. Fees for this group were lower by $15 relative to staff control subjects, although the result is statistically significant at the 10% level only under a one-sided test. Despite the weak statistical significance, the hashed bars in the top panel of Figure 1 suggest that this drop is not just due to random variation. Both cheaper funds received more money in the FAQ treatment than in the control condition, and both expensive funds received less money. The hashed bars in the top panel of Figure 2 show, however, that the FAQ treatment was not successful in increasing the number of subjects who chose the cheapest possible portfolio.

## IV. Interpretation

In order to gain insight into what motivated subjects' decisions in the four experimental conditions, we asked them in the debriefing survey (the staff version is reproduced in Appendix D) to rate how important eleven factors were in shaping their portfolio decision. 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 greater ordinal importance).

The staff and college control groups ranked fund performance over the past year and fund performance since inception as the first- and second-most important factors respectively. This helps explain why the Phoenix Insight fund received the most money from staff subjects (see Figure 1); as noted in Section I, both its one-year and long-horizon historical returns are

relatively high due to its fund inception date and prospectus publishing cycle. In contrast, the fund menu offered to students did not feature a clear winner on the historical returns dimension. Mason Street had the lowest one-year return (excluding loads) due to its high expense ratio, but the highest return since inception. Allegiant had the highest one-year return but the lowest return since inception. College control subjects ended up favoring the UBS fund, which had the second-highest one-year return and the second-highest return since inception.

The next two most important factors for staff and college control groups were the funds' investment objectives and the desire to diversify across funds. All S&P 500 index funds have the same investment objectives, so the high ranking of this factor is puzzling. Given that the four funds hold approximately the same portfolio, the high ranking of diversification suggests that subjects are misapplying a diversification heuristic (Benartzi and Thaler, 2001). Consistent with their reported diversification motive, 49% of the staff control group and 53% of the college control group allocated some money to all four funds. Of the eleven factors, fund fees, expenses, and loads were ranked fifth by control staff and eighth by control college students. In light of this ranking, it seems unlikely that college and staff subjects' search efforts were primarily directed towards finding the most relevant information about the funds—their cost.

In contrast, MBA control subjects ranked fees as the most important factor in their portfolio decision. As noted above, however, their fees are not significantly lower on average than the college control subjects' fees. The minimal gain that the MBA controls reaped from their prioritization of fees suggests that the cost of accurately finding fees in the prospectuses is relatively high even for MBAs and/or that the false allure of past returns—ranked second and third by the MBA controls—and other factors is strong enough to offset the benefits of prioritizing fees.

Providing the fees sheet elevated the importance ranking of fees. In the fees treatment condition, staff subjects ranked fees as their second-most important factor (versus fifth in the control condition), and college subjects ranked fees as their most important factor (versus eighth for the control group). MBAs in both the control and fees treatment conditions ranked fees as their most important factor, but the cardinal rating of fees in the fees treatment is higher. Staff subjects receiving the FAQ sheet also increased their relative rating of fees' importance slightly, raising their ordinal rank to fourth (versus fifth in the control condition), although the cardinal rating of fees is lower than in the control condition.

The returns sheet similarly elevated the relative ranking of long-horizon past returns for students. College students in the returns treatment condition ranked returns since inception as their most important factor (versus second for the control group), downgrading the more sensible one-year return factor to second place (versus first for the control group). MBAs in the returns treatment ranked the two past performance factors first and second (versus second and third for the control group). On the other hand, consistent with the weak effects we saw in Table 3, staff's ranking of returns' importance does not seem to have responded strongly to the returns sheet. Their ordinal ranking of returns remains the same (first and second) between the two conditions, and the cardinal ratings are only slightly higher in the returns treatment.

These factor rankings appear to contain real information. Table 5 presents results from a set of univariate regressions within each subject pool of portfolio fees and long-horizon past returns 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 less in fees, whereas those who rated returns since inception as more important chose portfolios with higher long-horizon historical returns.

The fees and returns treatment effects are consistent with the summary sheets' lowering search costs for subjects who value low fees and high past returns but observe both with considerable noise when given only prospectuses. When a characteristic is observed with zero precision, an agent should put no weight on it in her decision; conversely, when the characteristic's observational precision increases, the agent will put more weight on the characteristic, as our subjects who received a summary sheet reported doing. Furthermore, increased observational precision of a valued characteristic will cause subject portfolios to contain a higher share of funds with that valued attribute.

Under this interpretation, the returns sheet's null effect on staff—despite staff in both control and returns treatment conditions reporting that they placed high weight on the information contained in the returns sheet—implies that control staff (but not control students) observed past long-horizon returns relatively precisely. This may be due to the fact that staff were highly motivated by their large incentives and so expended more effort than students in

finding the past returns information. Staff, however, either did not believe that fees were similarly important or had a hard time finding fees in the prospectuses, so they did not precisely observe fees despite the high stakes. Hence, the fees sheet had scope to shift staff portfolios towards lower-cost funds.

The fact that highly motivated investors are able to accurately identify past returns in the prospectus does not necessarily imply that mutual fund advertising that highlights past returns has no effect on investment decisions. In the real world, investors must contend with thousands of mutual funds rather than just four, so even very highly motivated investors are likely to observe many (most) funds' past returns imprecisely prior to seeing an advertisement.

The search cost effects of the summary sheets may have been augmented by implicit advice effects, where subjects inferred that the information on the summary sheet is normatively important simply because it had been given to them by the experimenters. But if one chooses to interpret the treatment effects as arising *entirely* through the implicit advice channel, it is not obvious why staff heeded the implicit advice of the fees sheet but not the returns sheet.

Finally, the FAQ treatment lowered fees as expected, but did not move subjects close to the minimum-fee portfolio. This failure may be due to several factors. First, our FAQ answers may not have been clearly understood. Second, we did not explicitly state that the optimal portfolio allocated 100% to the lowest-cost fund, since any effect arising from distributing such a statement would be difficult to interpret in light of the strong experimenter demand effect the statement would generate. It may have been beyond the capability of most subjects to infer that cost-minimization is the optimal strategy when picking among mutual funds holding nearly identical portfolios. Third, the fees may have been too difficult to accurately identify in the prospectuses, causing subjects to place little weight on them in their portfolio decision. Finally, subjects may have continued to believe that there is a significant amount of active management in an index fund, leading to predictable outperformance unrelated to lower fees. Fund companies may intentionally contribute to this confusion in order to soften price competition (Gabaix and Laibson, 2006; Gabaix, Laibson, and Li, 2005; Carlin, 2006). For example, the Allegiant fund's 2006 prospectus states, "However, the Adviser believes that employing certain active management strategies for a percentage of the Fund's assets, if successful, will result in net returns after expenses that may more closely approximate the returns of the S&P 500 Index."

## V. 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 long-horizon historical returns on treatment, age, gender, and education dummies. Among staff subjects, we find that women paid higher fees, but there is surprisingly no relationship between education and fees. If anything, subjects who had only a high school education or less paid the lowest fees on average. This is because low-education subjects were more prone to distribute their portfolios evenly among the four investment options instead of chasing the Phoenix Insight fund's high past returns. The significant negative coefficient on the fees treatment dummy in the fees regression indicates that the staff fees treatment effect does not arise simply because staff who were randomized into the control group were somewhat less educated than staff who were randomized into the fees treatment group.

Among student subjects, we find that MBAs who are older and female chase past returns since inception more aggressively. In unreported regressions, we include total SAT scores (math plus verbal) as a control variable for student subjects, which causes our sample size to drop in half due to missing score data. We find no significant relationship between SAT scores and fees; the point estimate indicates that a 100 point rise in combined SAT score is associated with only a 3 basis point decline in fees among MBAs and a 3 basis point rise in fees among college students.

In addition to the basic demographic characteristics discussed above, the debriefing survey completed by respondents included questions designed to gauge financial knowledge and investment confidence. The second, fifth, and eighth 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 the highest on investment confidence and both the objective and self-assessed measures of financial knowledge. Staff subjects have intermediate levels of confidence and knowledge, and college students score the lowest on these measures.

The third, sixth, and ninth columns of Table 7 display a striking negative relationship between fees and confidence or knowledge. For example, in all three subject groups, the average fee increases monotonically with the self-reported likelihood that subjects would change their

decision after consulting a professional investment advisor. The subjects who paid the highest fees themselves doubted that they were making the best portfolio allocation. Fees also generally fall with the level of confidence or knowledge measured by questions about self-assessed confidence that the portfolio decision was the right one for the subject, self-assessed investment knowledge, and the types of investments found in a money market fund. The most notable non-monotonicities occur among MBAs who consider themselves "very knowledgeable" investors and college subjects who are "very confident" about their portfolio decision; these extremely confident subjects paid higher fees than many of their less confident peers, but represent a small fraction of their respective samples (6% of MBA and 5% of college subjects). Staff who were "not at all confident" about their decision paid lower fees than "somewhat confident" and "less than confident" staff (due to the tendency of the least confident staff to distribute their allocations more evenly across funds than their slightly more confident peers), but this group too represents only a small fraction (7%) of the staff sample.

In unreported regressions, we find that the negative relationship between financial knowledge/confidence and fees is generally present even after controlling for gender, education, and experimental treatment.[18] Therefore, responses to these survey questions are useful for predicting portfolio choice quality beyond what demographics and information conditions can tell us.

**Section VI. 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.[19] The subjects in this experiment were 36 law, MBA, and undergraduate students enrolled in a class at the University of Pennsylvania. Table 8 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

[18] The self-reported confidence and knowledge variables are assigned an integer from 1 to 3 or 1 to 5 in the regressions. For Harvard staff, self-assessed investment knowledge, confidence, and likelihood to change one's decision are significant. For MBAs, knowledge of money market fund investments and likelihood to change one's decision are significant. For college students, self-assessed investment knowledge and confidence are significant, and likelihood to change one's decision has a *p*-value of 0.13.

[19] Chronologically, this experiment was run before the index fund experiment.

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 tended 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. In contrast to the index fund experiment, this experiment had no returns or FAQ treatment conditions.

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 may not be optimally using fee information to make their choices. Table 9 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 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 10% level. 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 3 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% of total assets, whereas the highest cost fund (Scudder) accounts for 24% of total assets. Relative to the control group, participants in the fees treatment group allocated 19 percentage points more to the lowest-cost fund and 9 percentage points less to the highest-cost fund. Figure 4 shows the distribution of total fees in the control and fees treatment group portfolios. As expected given the results in Figure 3, the fee distribution shifts to the left for the fees treatment group. Table 10 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.

## VII. Conclusion

When consumers in a commodity market observe prices and quality with noise, a high degree of competition will not drive markups to zero (Gabaix, Laibson, and Li, 2005; Carlin, 2006). In this paper, we present an experiment that suggests investors exhibit confusion about the mutual fund market.

In our experiment's control condition, subjects reviewed four S&P 500 index fund prospectuses and allocated $10,000 across those funds. Subjects' expected payments depended on their subsequent portfolio performance. Because payments were made by the experimenters, investment company services like financial advice were unbundled from portfolio returns. Despite this unbundling, subjects overwhelmingly failed to minimize index fund fees. Even subjects who claimed to understand the importance of fees nevertheless showed minimal sensitivity to the fee information in the prospectus.

In one treatment condition, we made fee information transparent and salient. This reduced allocations to high-cost funds, but investors still overwhelmingly did not minimize index fund fees. These results imply that many investors do not understand the importance of mutual fund fees. Subjects based their choices on other normatively irrelevant mutual fund attributes—long-horizon past returns, in particular. Explaining to subjects that all S&P 500 index funds try to make their pre-fee returns equal the S&P 500 Index return had only a small effect on portfolio fees paid.

Our subjects demonstrated a low absolute level of financial sophistication, including those who were enrolled in an elite MBA program. However, our subjects are significantly *more* sophisticated than the typical American household that is contributing to a retirement account. It is likely that some investors—particularly high net worth investors—have managed to overtake the literacy of Wharton MBA students. Hence, asset markets may be efficient on a dollar-weighted basis. But welfare calculations, which are affected by asset management fees, are 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 be achieving their intended result. First, mutual fund investors may not see the fees, which are now published inside a long prospectus.[20] Second, even investors who do see the fees may not know how to use them in forming their portfolios. Unfortunately, new transparency regulations may have effects that are small and short-lived. Asset-management companies may respond to new regulations by shrouding their fees in other ways, such as through soft-dollar arrangements with their brokers.[21]

Our results also suggest that developing reliable ways of eliciting agents' confidence in their *own* actions may prove to be a fruitful way of identifying areas in which optimization errors play an economically important role. We show that subjects who pay higher fees tend to be less sure that they are maximizing their own utility. Students taking a math exam can roughly predict whether they got an answer right at the time they write down their answer. Economic agents may also know when they are likely to have made an error in a utility maximization problem. Unfortunately, having a sense that your choice is wrong does not necessarily tell you how to fix it.

[20] The SEC has recently proposed a simplified prospectus template that is shorter than traditional prospectuses. Another set of randomized experiments (Beshears et al., 2008) studies the impact of this simplified/shortened SEC disclosure form. The simplified disclosure has a modest effect on portfolio choice. The simplified SEC form leads investors to pick funds with average fees, including loads, of 329 basis points. A control group with access to traditional prospectuses picked funds with average fees of 354 basis points.

[21] In a soft-dollar agreement, a mutual fund will overpay its broker for trades in exchange for a return transfer of resources, like research services.. We thank Gideon Saar for bringing this issue to our attention.

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## Appendix A. Staff Investment Choice Sheet

### Subject number: _____

Please allocate $10,000 among the S&P 500 index funds listed below. You may choose to allocate all $10,000 to one fund or allocate your investment evenly or unevenly across as many funds as you like.

We will calculate how much money a real investor would get back if he or she sent $10,000 to the funds below according to the allocation that you choose, assuming that each fund received the investment at 3:00 P.M. on August 31, 2007, and the investments were sold at 3:00 P.M. on Friday, September 28, 2007 (the last business day of September). If the investment is worth more than $10,000 at the end of September 28, 2007, we will pay you the investment profit (the investment value minus $10,000). If the investment is worth less than $10,000 at the end of the period, you will not be responsible for these losses. This is a risk-free opportunity to win a potentially large reward.

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**PAYOFF CALCULATION EXAMPLES**

Example #1: Suppose selling your hypothetical investment on September 28, 2007 would give you $11,000. Then we would pay you $1,000, the difference between your original investment and your final investment value at the end of September (in addition to the $10 participation payment you will receive today).

Example #2: Suppose selling your hypothetical investment on September 28, 2007 would give you $8,500. Since your final account balance is less than $10,000, you would not be paid for your investment (but you would still keep the $10 participation payment you will receive today).

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Below is the menu of S&P 500 index funds from which you may choose.

- Write the dollar amount you would like to allocate to each fund in the last column
- You may invest in as many or as few funds as you choose
- Please be careful to allocate a total of exactly $10,000
- If you put money in a fund, that amount must satisfy the minimum opening allocation requirement

| Mutual Fund | Symbol | Minimum Opening Allocation if Buying Shares in Fund | Your Allocation in Dollars (column must sum to $10,000) |
|---|---|---|---|
| Allegiant S&P 500 Index Fund - Class A | AEXAX | $500 | |
| Morgan Stanley S&P 500 Index Fund - Class A | SPIAX | $1,000 | |
| Phoenix Insight Index Fund - Class A | HIDAX | $500 | |
| UBS S&P 500 Index Fund - Class A | PSPIX | $1,000 | |

**→ The prospectuses for these 4 funds are attached ←**

Any portfolio allocations which violate minimum opening allocation requirements or which fail to total $10,000 will be ineligible for the investment payout.

## Appendix B. Staff Fees Summary Sheet

### FEE INFORMATION

- Mutual funds charge fees to investors.
- Some mutual funds charge a one-time fee when you purchase shares. This fee is called a *front-end load* and is a fixed percent of your purchase amount.
- Mutual funds also charge an ongoing fee that is a predetermined fraction of the fund balance. Over the course of one year, the total ongoing fee approximately equals:
  (Your average fund balance) × (The fund's *expense ratio*)
- Other fees may apply. Please check the fund's prospectus for more details.

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### TABLE OF FEES

| Mutual fund | Symbol | Front-end load | Front-end load fee if you purchase $10,000 worth of shares | Expense ratio | Approximate annual ongoing fee if your average balance is $10,000 |
|---|---|---|---|---|---|
| Allegiant S&P 500 Index Fund - Class A | AEXAX | 2.50% | **$250** | 0.60% | **$60** |
| Morgan Stanley S&P 500 Index Fund - Class A | SPIAX | 5.25% | **$525** | 0.64% | **$64** |
| Phoenix Insight Index Fund - Class A | HIDAX | 5.75% | **$575** | 0.73% | **$73** |
| UBS S&P 500 Index Fund - Class A | PSPIX | 2.50% | **$250** | 0.70% | **$70** |

**Front-end load example**

If you purchase $10,000 worth of shares in a fund and the front-end load is 2.5%, then you would pay

$10,000 × 2.5% = $250

in load fees at the time of purchase.

**Expense ratio example**

If the average balance is $10,000 and the expense ratio is 0.60%, then an investor would pay approximately

$10,000 × 0.60% = $60

in ongoing fees over the course of one year.

## Appendix C. Staff Returns Summary Sheet

### RETURN INFORMATION

| Mutual Fund | Symbol | Average Annual Return (During Longest Time Period Reported in Fund's Prospectus)[1] |
|---|---|---|
| Allegiant S&P 500 Index Fund - Class A | AEXAX | 3.1% [2] |
| Morgan Stanley S&P 500 Index Fund - Class A | SPIAX | 3.6% [3] |
| Phoenix Insight Index Fund - Class A | HIDAX | 7.3% [4] |
| UBS S&P 500 Index Fund - Class A | PSPIX | 3.8% [5] |

[1] Includes the effect of fees, expenses, and sales loads, but not taxes.
[2] 10/15/1998 – 12/31/2005
[3] 09/26/1997 – 12/31/2005
[4] 01/01/1997 – 12/31/2006
[5] 10/02/1998 – 12/31/2005

*Past performance is no guarantee of future results.*

**Appendix D. Staff FAQ Sheet**

# FREQUENTLY ASKED QUESTIONS (FAQs)

## QUESTION 1: What is a mutual fund?

*Answer*: A mutual fund invests money on your behalf.

Any money you give a mutual fund to manage will earn the same percent return as the investments the mutual fund holds, minus the fees the mutual fund charges you for its services.

## QUESTION 2: What is an S&P 500 index fund?

*Answer*: An S&P 500 index fund is a mutual fund that tries to make its pre-fee investment return approximate the S&P 500 Index's investment return.

## QUESTION 3: What is the S&P 500 Index?

*Answer*: The S&P 500 Index measures the total stock market value of 500 of the largest U.S. companies. It is one of the most widely used stock market indexes in the world.

The investment return of the S&P 500 Index is the percent change over time in the total stock market value of these 500 companies.

**Table 1. Characteristics of Index Funds Used in Experiment**

This table shows information on the mutual funds used in the index fund experiment, taken from the most up-to-date prospectuses available at the time of the experimental sessions. The approximate fee on a $10,000 investment is calculated for the investment horizon of the experiment: one month for the Harvard staff members, and one year for the Wharton MBA and Harvard College students.

| Mutual fund and share class | Ticker symbol | Inception date | Minimum opening balance | Expense ratio[a] | Front-end load | Approximate fee on $10K investment | Longest-horizon return in prospectus[b] |
|---|---|---|---|---|---|---|---|
| *Panel A: Wharton MBA and Harvard College experiment (2005)* | | | | | | | |
| Allegiant S&P 500 Index Fund – Class A | AEXAX | 11/15/1998 | $500 | 0.59% | 2.50% | $309 | 1.28%[c] |
| Mason Street Index 500 Stock Fund – Class A | MISAX | 3/31/1997 | $1,000 | 0.80% | 4.75% | $555 | 5.90%[c] |
| Morgan Stanley S&P 500 Index Fund – Class A | SPIAX | 9/26/1997 | $1,000 | 0.64% | 5.25% | $589 | 2.54%[c] |
| UBS S&P 500 Index Fund – Class A | PSPIX | 10/2/1998 | $1,000 | 0.70% | 2.50% | $320 | 2.54%[c] |
| *Panel B: Harvard staff experiment (2007)* | | | | | | | |
| Allegiant S&P 500 Index Fund – Class A | AEXAX | 10/15/1998 | $500 | 0.60% | 2.50% | $255 | 3.08%[c] |
| Morgan Stanley S&P 500 Index Fund – Class A | SPIAX | 9/26/1997 | $1,000 | 0.64% | 5.25% | $530 | 3.64%[c] |
| Phoenix Insight Index Fund – Class A | HIDAX | 4/19/1996 | $500 | 0.73% | 5.75% | $581 | 7.34%[d] |
| UBS S&P 500 Index Fund – Class A | PSPIX | 10/2/1998 | $1,000 | 0.70% | 2.50% | $356[e] | 3.80%[c] |

[a] After fee waivers
[b] Annualized and after fees, expenses, and sales loads, but before taxes
[c] Return since fund inception
[d] 10-year return
[e] Includes 1% early redemption fee

**Table 2. Experimental Subject Characteristics**

This table shows the characteristics of the subjects in each experimental condition. Some fields are blank because certain questions were not asked of all subjects. 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. Some statistics are calculated with slightly smaller sample sizes than reported in the last row, due to non-response.

| | Harvard staff | | | | MBA students | | | College students | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Control group | Fees treatment | Returns treatment | FAQ treatment | Control group | Fees treatment | Returns treatment | Control group | Fees treatment | Returns treatment |
| Average age | 41.1 | 39.4 | 41.5 | 40.4 | 27.7 | 27.4 | 27.4 | 21.0 | 22.0 | 21.0 |
| Percent male | 37% | 29% | 35% | 37% | 63% | 66% | 70% | 50% | 48% | 63% |
| Highest education | | | | | | | | | | |
| High school or less | 3% | 0% | 5% | 1% | 1% | 0% | 0% | 7% | 10% | 8% |
| Some college | 9% | 11% | 8% | 9% | 1% | 0% | 0% | 83% | 76% | 74% |
| College degree | 30% | 22% | 28% | 34% | 98% | 100% | 100% | 10% | 14% | 19% |
| Some graduate school | 19% | 15% | 20% | 19% | -- | -- | -- | -- | -- | -- |
| Graduate degree | 39% | 52% | 38% | 37% | -- | -- | -- | -- | -- | -- |
| SAT I 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 or do not wish to answer | -- | -- | -- | -- | 23% | 15% | 14% | 7% | 10% | 11% |
| Knows what a money market fund holds | 28% | 19% | 22% | 18% | 33% | 42% | 44% | 14% | 17% | 14% |
| Average risk rating (1 to 5; higher = riskier) | | | | | | | | | | |
| Fortune 500 stock | 3.34 | 3.49 | 3.59 | 3.58 | 3.02 | 3.36 | 3.28 | 3.57 | 3.14 | 2.79 |
| U.S. equity mutual fund | 3.12 | 2.98 | 3.16 | 3.14 | 2.68 | 2.98 | 2.74 | 2.70 | 2.43 | 2.25 |
| Avg. self-reported minutes reading prospectus | 13.3 | 13.4 | 14.3 | 14.4 | 13.6 | 11.1 | 10.7 | 11.2 | 8.4 | 8.5 |
| Sample size | $N = 97$ | $N = 97$ | $N = 100$ | $N = 97$ | $N = 83$ | $N = 85$ | $N = 84$ | $N = 30$ | $N = 29$ | $N = 28$ |

**Table 3. Average Portfolio Fees and Historical Returns**

The top half of the table gives the average (weighted by dollar allocation) fees and historical returns of the funds chosen by each experimental group. For staff, the historical return is the longest-horizon annualized return reported in the fund's prospectus. For students, the historical return is the annualized return since fund inception. The bottom half of the table reports two-sided *p*-values of *t* tests for the equality of mean fees and historical returns, allowing for each group to have a different variance. The null hypothesis is listed in the first column, and each subsequent column corresponds to a different subject 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 Harvard staff subjects paid the same average fee as the Harvard staff subjects in the fees treatment group.

| | Harvard staff | | MBA students | | College students | |
|---|---|---|---|---|---|---|
| | Average fees | Average long-horizon past return | Average fees | Average returns since inception | Average fees | Average returns since inception |
| Control group | $456 | 4.96% | $421 | 3.06% | $431 | 2.86% |
| Fees treatment group | $432 | 4.80% | $366 | 2.30% | $410 | 2.61% |
| Returns treatment group | $450 | 4.90% | $440 | 3.53% | $486 | 4.03% |
| FAQ treatment group | $441 | 4.82% | -- | -- | -- | -- |
| Two-sided *p*-values from *t* tests of equality of means (unequal variances) | | | | | | |
| Control = fees treatment | 0.045 | 0.346 | 0.000 | 0.000 | 0.290 | 0.152 |
| Control = returns treatment | 0.612 | 0.690 | 0.164 | 0.012 | 0.002 | 0.000 |
| Control = FAQ treatment | 0.186 | 0.402 | -- | -- | -- | -- |
| Fees treatment = returns treatment | 0.109 | 0.538 | 0.000 | 0.000 | 0.000 | 0.000 |
| Fees treatment = FAQ treatment | 0.454 | 0.926 | -- | -- | -- | -- |

**Table 4. Importance of Various Factors in Subjects' Investment Decision**

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, with *higher* integers corresponding to greater importance. Each factor's ordinal rank for the relevant subsample is in parentheses, with *lower* integers corresponding to greater ordinal importance. The last row lists the greatest number of observations used to calculate each column's average ratings; some factors' average ratings use slightly fewer observations due to non-response.

| | Harvard staff | | | | MBA students | | | College students | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Control group | Fees treatment | Returns treatment | FAQ treatment | Control group | Fees treatment | Returns treatment | Control group | Fees treatment | Returns treatment |
| Quality of prospectus | 2.61 (7) | 2.80 (6) | 2.65 (7) | 2.65 (7) | 2.27 (9) | 2.46 (9) | 2.65 (8) | 2.75 (5) | 2.93 (4) | 2.96 (5) |
| Brand recognition | 2.36 (8) | 2.32 (8) | 2.36 (8) | 2.29 (8) | 2.75 (6) | 2.77 (6) | 2.75 (7) | 2.63 (7) | 2.79 (5) | 3.00 (4) |
| Past experience with fund companies | 2.20 (9) | 2.15 (9) | 2.25 (9) | 1.96 (9) | 2.39 (8) | 2.74 (7) | 2.57 (9) | 1.43 (11) | 2.11 (9) | 2.26 (8) |
| Fund fees, expenses, and loads | 3.05 (5) | 3.41 (2) | 2.92 (5) | 2.94 (4) | 3.72 (1) | 4.19 (1) | 3.53 (3) | 2.59 (8) | 3.39 (1) | 2.54 (7) |
| Minimum opening balance requirements | 1.96 (11) | 2.10 (10) | 1.86 (11) | 1.89 (10) | 1.77 (11) | 2.07 (11) | 1.80 (11) | 1.60 (10) | 1.97 (10) | 1.68 (11) |
| Investment objectives | 3.18 (3) | 3.39 (4) | 3.08 (4) | 3.23 (3) | 3.24 (4) | 3.52 (4) | 3.41 (4) | 3.00 (4) | 2.76 (6) | 2.79 (6) |
| Fund performance over the past year | 3.57 (1) | 3.88 (1) | 3.58 (1) | 3.52 (1) | 3.54 (2) | 3.73 (2) | 3.78 (1) | 4.17 (1) | 3.17 (2) | 3.54 (2) |
| Fund performance since inception | 3.40 (2) | 3.40 (3) | 3.45 (2) | 3.30 (2) | 3.45 (3) | 3.63 (3) | 3.72 (2) | 3.87 (2) | 2.97 (3) | 3.86 (1) |
| Fund performance over different horizon | 2.89 (6) | 2.63 (7) | 2.73 (6) | 2.68 (6) | 2.67 (7) | 3.16 (5) | 2.88 (5) | 2.72 (6) | 2.18 (8) | 2.22 (9) |
| Customer service of fund | 2.02 (10) | 2.06 (11) | 1.94 (10) | 1.85 (11) | 1.87 (10) | 2.17 (10) | 1.90 (10) | 1.97 (9) | 1.93 (11) | 1.82 (10) |
| Desire to diversify across funds | 3.07 (4) | 2.81 (5) | 3.18 (3) | 2.75 (5) | 2.89 (5) | 2.73 (8) | 2.78 (6) | 3.33 (3) | 2.76 (6) | 3.39 (3) |
| Sample size | $N = 97$ | $N = 97$ | $N = 100$ | $N = 96$ | $N = 83$ | $N = 84$ | $N = 83$ | $N = 30$ | $N = 29$ | $N = 28$ |

**Table 5. Effect of Factor Importance Ranking on Portfolio Fees and Historical Returns**
Each cell reports the slope coefficient from a univariate regression of subjects' portfolio fees or average fund historical returns (dollar-weighted) on subjects' ratings of each factor's importance in shaping their investment decision. For staff, the historical return is the longest-horizon annualized return reported in the fund's prospectus. For students, the historical return is the annualized return since fund inception. The explanatory variables are coded as integers from 1 to 5, where 1 corresponds to the response "not at all important" and 5 to the response "very important." The last row lists the greatest number of observations used in each column's regressions; some regressions use slightly fewer observations due to non-response. Standard errors are in parentheses.

| | Harvard staff | | MBA students | | College students | |
|---|---|---|---|---|---|---|
| | Portfolio fees | Long-horizon past return | Portfolio fees | Returns since inception | Portfolio fees | Returns since inception |
| Quality of prospectus | 8.53* | 0.046 | 9.27 | 0.071 | -1.26 | -0.083 |
| | (3.55) | (0.052) | (4.98) | (0.069) | (6.66) | (0.089) |
| Brand recognition | -3.03 | -0.233** | 10.45* | -0.025 | 13.10* | 0.033 |
| | (3.78) | (0.053) | (4.39) | (0.061) | (6.39) | (0.086) |
| Past experience with fund companies | -2.57 | -0.085 | 5.98 | 0.049 | 12.46* | 0.136 |
| | (3.29) | (0.047) | (4.11) | (0.057) | (6.12) | (0.082) |
| Fund fees, expenses, and loads | -17.33** | -0.188** | -22.21** | -0.283** | -16.95** | -0.152 |
| | (2.80) | (0.041) | (4.17) | (0.058) | (5.81) | (0.079) |
| Minimum opening balance requirement | -0.41 | -0.051 | -3.22 | -0.113 | -0.67 | -0.021 |
| | (3.82) | (0.055) | (5.41) | (0.074) | (7.56) | (0.099) |
| Investment objectives | 2.07 | 0.024 | 0.53 | 0.039 | -5.68 | -0.122 |
| | (3.32) | (0.048) | (3.86) | (0.053) | (5.92) | (0.077) |
| Fund performance over the past year | 18.16** | 0.328** | 3.28 | 0.077 | -4.94 | 0.008 |
| | (3.22) | (0.045) | (4.19) | (0.057) | (6.77) | (0.089) |
| Fund performance since inception | 15.70** | 0.188** | 6.55 | 0.132* | -0.54 | 0.139 |
| | (3.02) | (0.044) | (3.98) | (0.055) | (5.85) | (0.075) |
| Fund performance over a different horizon | 9.91** | 0.110* | -1.43 | -0.006 | 2.86 | 0.000 |
| | (3.03) | (0.044) | (4.09) | (0.056) | (6.32) | (0.084) |
| Customer service of fund | 1.85 | -0.048 | 8.44 | 0.024 | -0.84 | -0.132 |
| | (3.75) | (0.054) | (5.31) | (0.073) | (7.60) | (0.098) |
| Desire to diversify across funds | 3.88 | -0.006 | 13.52** | 0.060 | 9.93 | 0.029 |
| | (2.96) | (0.042) | (3.81) | (0.054) | (5.97) | (0.079) |
| Sample size | $N = 385$ | $N = 385$ | $N = 250$ | $N = 250$ | $N = 87$ | $N = 87$ |

* Significant at the 5% level. ** Significant at the 1% level.

**Table 6. Demographic Correlates of Portfolio Fees and Historical Returns**

This table reports regressions where the dependent variable is portfolio fee or average fund historical returns (dollar-weighted). For staff, the historical return is the longest-horizon annualized return reported in the fund's prospectus. For students, the historical return is the annualized return since fund inception. *Fees treatment*, *Returns treatment*, and *FAQ treatment* are dummies for being in the fees treatment group, returns treatment group, and FAQ treatment group, respectively. *Female* is a dummy for female gender. *High school or less*, *Some college*, *College degree*, *Some graduate school*, and *Graduate degree* are dummies for the highest educational attainment reported by subjects. The regressions were run without a constant term and with a full set of applicable education dummies. Standard errors are in parentheses.

| | Harvard staff | | MBA students | | College students | |
|---|---|---|---|---|---|---|
| | Portfolio fees | Long-horizon past return | Portfolio fees | Returns since inception | Portfolio fees | Returns since inception |
| *Fees treatment* | -26.90*<br>(11.51) | -0.189<br>(0.166) | -51.46**<br>(12.69) | -0.699**<br>(0.166) | -20.72<br>(18.04) | -0.234<br>(0.204) |
| *Returns treatment* | -7.13<br>(11.32) | -0.086<br>(0.164) | 23.04<br>(12.75) | 0.554**<br>(0.167) | 59.75**<br>(18.30) | 1.214**<br>(0.207) |
| *FAQ treatment* | -16.65<br>(11.41) | -0.180<br>(0.165) | -- | -- | -- | -- |
| *Age* | 0.06<br>(0.35) | 0.001<br>(0.005) | 3.58<br>(2.63) | 0.081*<br>(0.034) | -1.84<br>(1.89) | 0.013<br>(0.021) |
| *Female* | 25.95**<br>(8.58) | 0.164<br>(0.124) | 18.39<br>(11.17) | 0.317*<br>(0.146) | 11.04<br>(15.27) | -0.031<br>(0.173) |
| *High school or less* | 412.4**<br>(32.15) | 4.124**<br>(0.465) | 461.85**<br>(106.21) | 3.796**<br>(1.387) | 351.81**<br>(44.47) | 2.400**<br>(0.504) |
| *Some college* | 441.63**<br>(22.82) | 4.608**<br>(0.330) | 302.85**<br>(106.56) | 0.460<br>(1.391) | 392.19**<br>(43.11) | 2.665**<br>(0.488) |
| *College degree* | 429.39**<br>(17.60) | 4.703**<br>(0.255) | -- | -- | 370.21**<br>(53.83) | 2.215**<br>(0.610) |
| *Some graduate school* | 455.75**<br>(17.64) | 5.125**<br>(0.255) | 313.21**<br>(74.36) | 0.668<br>(0.971) | -- | -- |
| *Graduate degree* | 434.94**<br>(18.30) | 4.815**<br>(0.265) | -- | -- | -- | -- |
| Sample size | $N$ = 389 | $N$ = 389 | $N$ = 250 | $N$ = 250 | $N$ = 87 | $N$ = 87 |

* Significant at the 5% level. ** Significant at the 1% level

**Table 7. Portfolio Fees and Historical Returns by Investor Confidence and Knowledge**

This table reports the frequency of responses to four debriefing survey questions and the average portfolio fee or average (weighted by dollar allocation) fund historical returns of those who gave each response.

| | Harvard staff | | | MBA students | | | College students | | |
|---|---|---|---|---|---|---|---|---|---|
| | Proportion of answers | Average portfolio fee | Average historical return | Proportion of answers | Average portfolio fee | Avg. returns since inception | Proportion of answers | Average portfolio fee | Avg. 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 | 13% | $456 | 4.42% | 20% | $389 | 2.76% | 6% | $395 | 2.60% |
| Somewhat likely | 50% | $513 | 4.94% | 54% | $409 | 2.96% | 41% | $435 | 3.00% |
| Very likely | 37% | $519 | 4.95% | 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 | 8% | $454 | 4.56% | 12% | $356 | 2.64% | 5% | $443 | 3.34% |
| Relatively confident | 28% | $497 | 4.71% | 47% | $384 | 2.98% | 25% | $420 | 2.91% |
| Somewhat confident | 39% | $521 | 5.01% | 25% | $413 | 2.99% | 31% | $441 | 3.07% |
| Less than confident | 19% | $520 | 4.99% | 13% | $414 | 2.89% | 23% | $458 | 3.29% |
| Not at all confident | 7% | $505 | 4.90% | 4% | $439 | 3.63% | 16% | $458 | 3.43% |
| Q8. *How knowledgeable an investor do you consider yourself to be?* | | | | | | | | | |
| Very knowledgeable | 2% | $422 | 4.37% | 6% | $427 | 3.20% | 1% | $320 | 2.50% |
| Relatively knowledgeable | 12% | $476 | 4.66% | 22% | $397 | 2.89% | 10% | $412 | 2.90% |
| Somewhat knowledgeable | 40% | $510 | 4.91% | 35% | $408 | 2.87% | 24% | $430 | 2.95% |
| Less than knowledgeable | 31% | $518 | 4.90% | 30% | $409 | 2.94% | 28% | $432 | 3.09% |
| Not at all knowledgeable | 15% | $519 | 5.00% | 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) | 21% | $500 | 4.94% | 40% | $393 | 2.80% | 15% | $442 | 3.24% |
| Incorrect answer (corporate bonds, stocks, none of the above) | 79% | $509 | 4.85% | 60% | $420 | 3.06% | 85% | $445 | 3.15% |

**Table 8. Small Cap Value Fund Experiment: Fund Characteristics**

This table shows information on the mutual funds used in the small cap value fund experiment, taken from the most up-to-date prospectuses available at the time of the experimental sessions. These prospectuses were published in the second half of 2003 and give returns information as of year-end 2002.

| Mutual fund and share class | Ticker 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% |

[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 9. Small Cap Value Fund Experiment: Average Portfolio Fees**

This table reports the average fee on a $10,000 investment paid by the control and fees treatment groups in the small cap value fund experiment, where the fund fees correspond to those found in Table 8. In addition, it presents the *p*-value from a test of the null hypothesis that the mean fee paid by both groups is equal, allowing for each group to have a different variance.

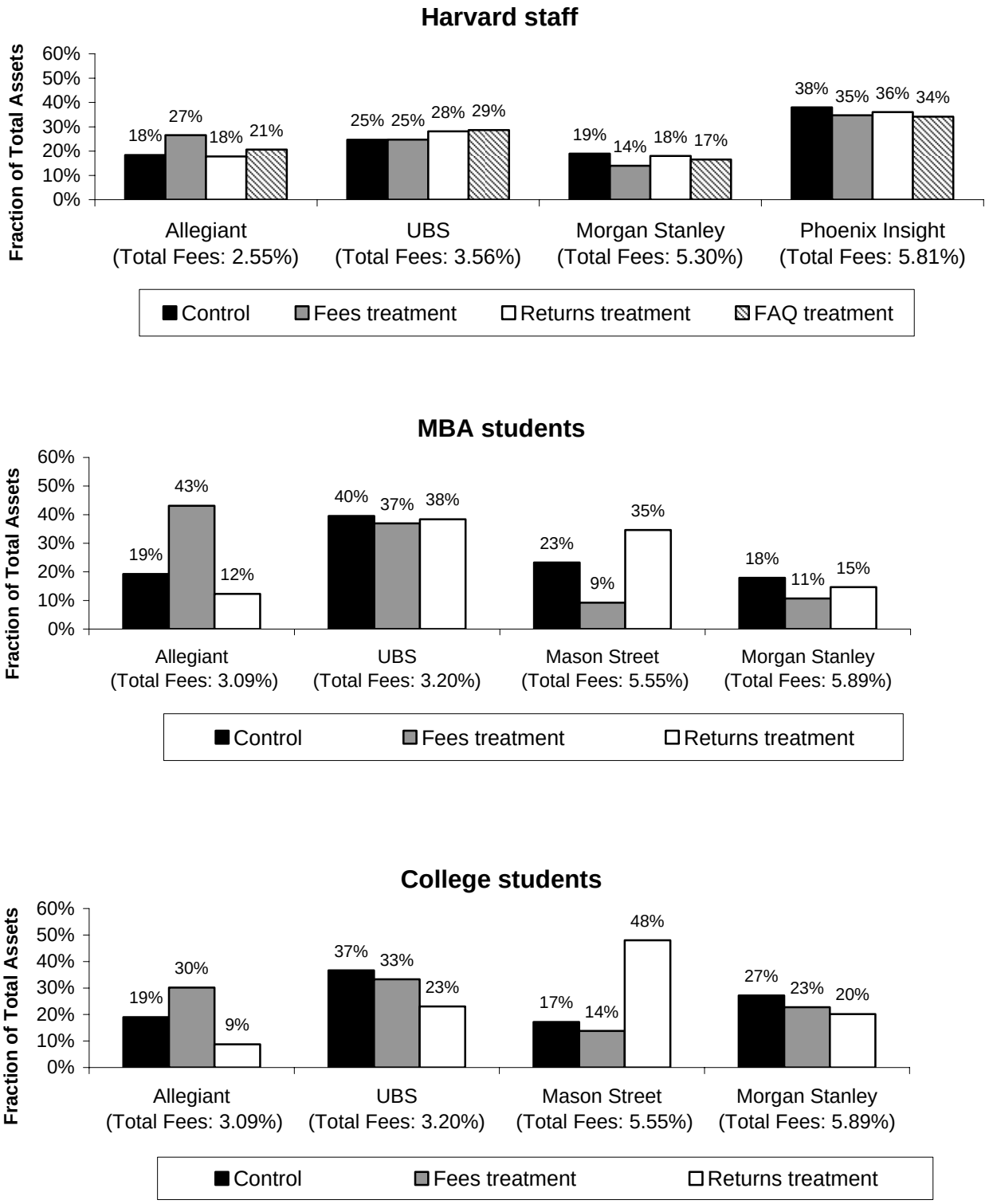
| | |
|---|---|
| Control ($N$ = 18) | $720 |
| Fees treatment ($N$ = 18) | $705 |
| Two-sided *p*-value from *t* test of equality of means (unequal variances) | |
| Control = fees treatment | 0.0568 |

**Table 10. Small Cap Value Fund Experiment: Importance of Various Factors in Subjects' Investment Decision**

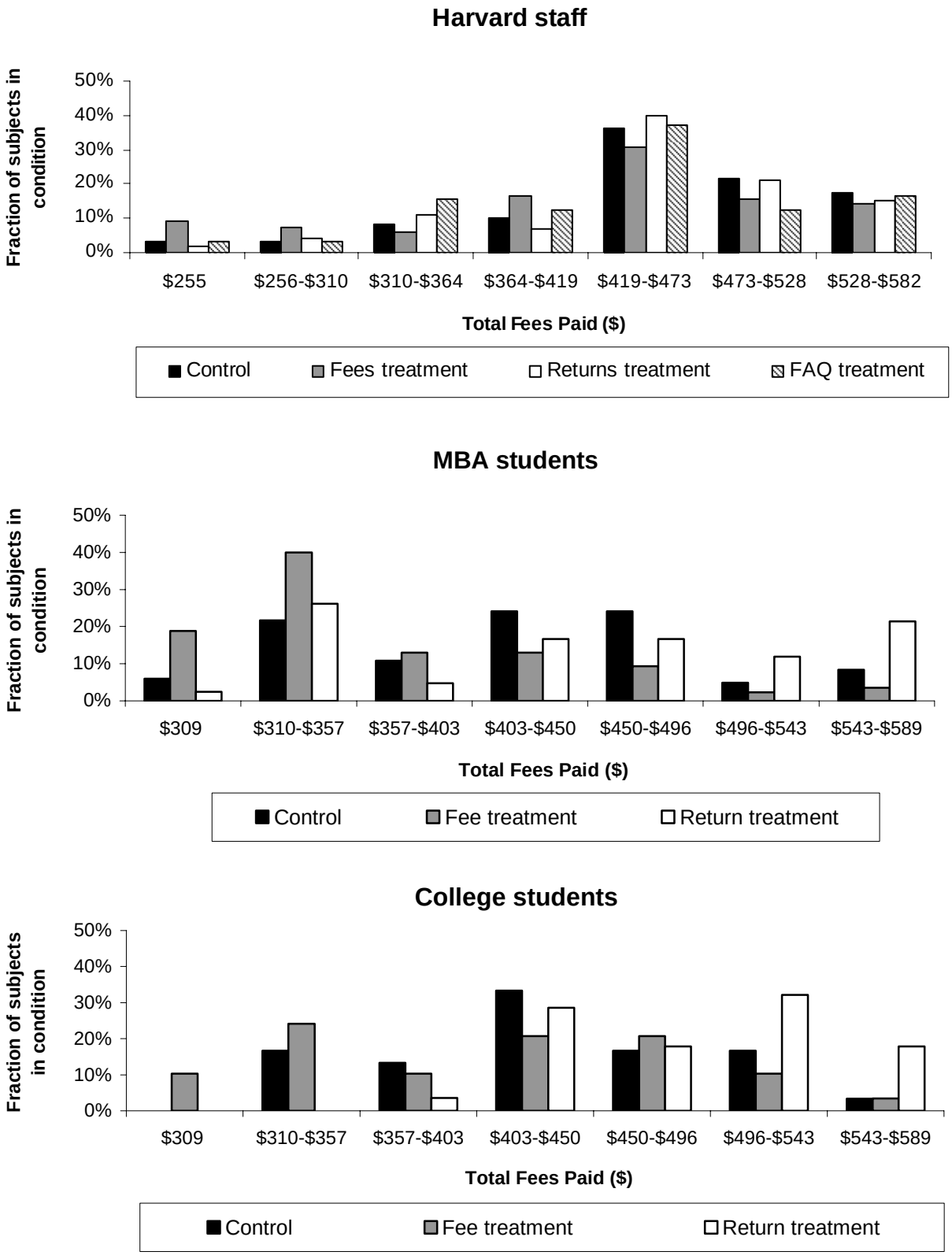
Each cell reports the average importance the factor had on the relevant subsample's investment decision, as elicited in the debriefing surveys. There were five possible responses, from "not important at all" to "very important." We assigned integers 1 through 5 to each possible response, with *higher*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

| | Control | Fee 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 |

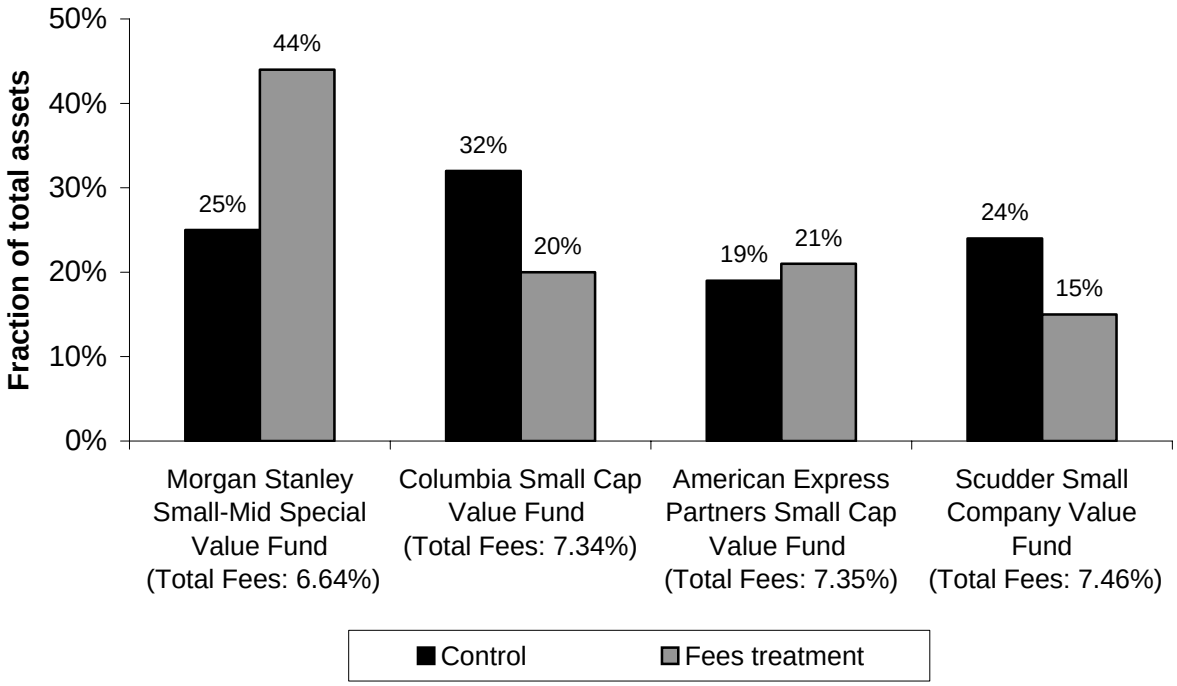
# Figure 1. Average Fund Allocations by Subject Group and Experimental Condition



# Figure 2. Histogram of Fees Paid by Subject Group and Experimental Condition



## Figure 3. Small Cap Value Experiment: Average Fund Allocations by Experimental Condition




## Figure 4. Small Cap Value Experiment: Histogram of Fees Paid by Experimental Condition.