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Mutual Fund Fees in Retirement Investing**

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An Experiment on Mutual Fund Fees in Retirement Investing

Tess Wilkinson-Ryan^{*} & Jill E. Fisch^{**}

Abstract: Over time, mutual fund fees have dramatic effects on investor returns, but evidence suggests that most investors ignore or misunderstand the impact of fund fees. It is unclear whether this behavior is due to the complexity of fee disclosures or to systematic underestimation of the real cost of fees, and this paper presents the results of an experiment designed to disentangle these explanations. Subjects played a web-based investment game, allocating money among fictional funds. They saw simplified information about each fund and were paid based on the simulated 30-year performance of their portfolios. We recorded each subject's investment decisions and which informational links (fees, risk, holdings, etc.) they clicked. Some subjects were randomly assigned to receive a short instruction about the importance of fees. Subjects who received the instruction were more likely to look for and use information about fund fees. We conclude that when fee information is presented simply, educating investors about the importance of fees updates their investment beliefs, motivates more thorough research, and yields higher-value investment choices.

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1. INTRODUCTION

In the last thirty years, retirement saving has increasingly come under the control of individual investors. As of 2005, more than 55 million employees participated in 401(k) plans and other defined contribution plans, giving employees, rather than professional investment managers, the responsibility for directing the investment of almost \$3 trillion in assets (Investment Company Institute 2006). Perhaps unsurprisingly, the behavioral finance literature and the popular media have begun to document patterns of costly investor mistakes. Though some of these mistakes have been very high-profile¹ others are subtler but nonetheless very costly over the long term.

Among these is the phenomenon of systematic under-attention to mutual fund fees, the focus of this paper. Over a period of years, mutual fund fees have dramatic effects on investor returns. Morningstar's Director of Mutual Fund Research recently observed, "If there's anything in the whole world of mutual funds that you can take to the bank, it's that expense ratios help you make a better decision," (Kinnel 2010). Nonetheless, mounting evidence suggests that most investors ignore or drastically undervalue fund fees (Beshears 2011).²

This apparent behavioral anomaly has real legal implications. Section 36(b) of the Investment Company Act³ imposes a duty on mutual fund advisors not to charge excessive fees—but what are excessive fees? How we answer that question depends in part on how we understand investor behavior.⁴ In considering the appropriate legal standard for courts to apply in ruling upon challenges under the statute,⁵ Judge Easterbrook, writing for the Seventh Circuit panel in *Jones v. Harris*⁶ wrote that "competition over mutual fund purchases should constrain advisory fees."⁷ His argument was essentially that, in a functioning market, when funds charge excessive fees, investors will reject those funds in favor of more fairly-priced alternatives. Judge Posner responded by asking the important empirical question: "will high fees drive investors away?" (emphasis added).⁸ This study begins to answer Judge Posner's question, using experimental methods to assess how fees affect investors' selection of mutual funds.

¹ Perhaps the most dramatic example was that of Enron employees, who invested 62% of their 401(k) assets in Enron stock and lost over \$1 billion dollars when the company collapsed (Weston, 2001).

² Former SEC Chair Arthur Levitt testified before Congress in 1998 that "Our own research shows that fewer than one in five fund investors could give any estimate of expenses for their largest mutual fund and fewer than one in six fund investors understood that higher expenses can lead to lower returns" (Securities & Exchange Commission 1998).

³ 15 U.S.C. §§ 80a-1 to -64 (2006).

⁴ Indeed, this question was raised in the amicus briefs for the case (e.g., Brief of Robert Litan et al. as Amici Curiae Supporting Petitioners at 5, *Jones v. Harris Assocs.*, No. 08-586 (U.S. Mar. 30, 2010)), and was a key question for the influential Coates & Hubbard (2008) paper on mutual fund regulation.

⁵ Quinn Curtis and John Morley report that investors filed 91 suits against mutual fund advisors alleging excessive fees between 2000 and 2009. (Curtis & Morley 2012).

⁶ *Jones v. Harris Assocs.*, 527 F.3d 627 (7th Cir. 2008).

⁷ *Id.* at 631.

⁸ *Jones v. Harris Assocs.*, 537 F.3d 728, 732 (7th Cir. 2008) (Posner, J., dissenting)

The mutual fund disclosure requirements imposed by the Securities & Exchange Commission present individual non-expert mutual fund investors with a glut of information about each fund: its risk profile, its operating expenses, its performance over multiple time horizons, its holdings, its managers, and more. Consumers with moderate financial literacy and sophistication would need to invest substantial time and attention to achieve a reasonably accurate picture of their options. Then, even making the strong assumption that individuals understand the information provided for each fund, there is evidence that they have difficulty integrating that information—weighting attributes and comparing options—and using it to choose investments. This may be because consumers are perplexed by the volume of information in fund prospectuses or distracted by the highly salient presentations of fund performance. Investors may also ignore fees because fees are presented in terms of fractions of a percent, and many people assume that their real cost is negligible. Here, we begin with the basic contention that people underestimate the real costs of fund fees, and predict that if this is the case, they will be more attentive to fees if they learn about the large effects of fees on returns. Using a new incentive-compatible investment experiment, we present results showing that consumers who are informed of the effects of fees on fund returns are more likely to look for fee information and more likely to choose lower-fee funds.

The remainder of this article is organized as follows. Part 2 briefly describes the literature on mutual fund fees and identifies the critical regulatory question—whether investors exert market discipline over fee levels through their investment decisions. Part 3 assesses the behavioral economics literature that explores the extent to which investors consider fees in selecting mutual funds. Part 4 explains the structure of our experiment. Part 5 describes our results. Part 6 discusses the significance of our findings. In Part 7 we identify several possible limitations of our approach and discuss next steps for additional research. Part 8 concludes.

2. LAW & ECONOMICS OF MUTUAL FUND FEES

Mutual fund fees vary wildly. Expense ratios—funds’ annual operating expenses—vary from 0.10% to well over 2.0%, meaning that people pay over twenty times more per year for some funds than others.⁹ This difference has enormous financial consequences for investors. To put these prices into perspective, imagine an investor who puts \$10,000 into a fund that he or she expects to hold for 30 years, and assume an 8% rate of return before fees. If the fund’s operating expenses are .5%, the fund’s final value will be more than \$85,000. If the operating expenses are 2.0%, the final value will be less than \$55,000. One study estimates that in 2007 alone, retail investors paid \$206 million more in S&P index fund expenses than they would have paid had all investments been in the lowest-fee funds (Choi, Laibson and Madrian 2012).

from denial of rehearing en banc), denying reh’g to 527 F.3d 627 (7th Cir. 2008), vacated No. 08-586 (U.S. Mar. 30, 2010), <http://www.supremecourt.gov/opinions/09pdf/08-586.pdf>.

⁹ In addition to operating expenses, mutual fund investors may pay sales or redemption charges (loads) and distribution fees (12b-1 fees) (Investment Company Institute 2003).

Economics and finance scholars remain divided on the best explanation for price dispersion in the mutual fund market. Some scholars argue that mutual funds are competitively priced, and that their fees can be explained by economic variables—that is, that funds with higher fees are offering something that is in demand by some segment of buyers, including both higher returns and things like investment advice or check-writing and web access. On the other side is a growing collection of evidence that the market for mutual funds is not competitive on price, largely because uninformed investors do not appear able or willing to distinguish between cheap and expensive funds.

There are theoretical and empirical arguments on both sides of the issue. The baseline theoretic argument for competitive fees is that as long as investors have enough mutual fund options and are able to observe fees directly or indirectly, funds will lose customers if they charge unnecessarily high fees. In the law and economics literature, Coates and Hubbard (2008) argue forcefully that the existence of redeemable shares means that investors can and do “fire” fund advisers by switching to other investments. Although they acknowledge that there is substantial price dispersion even within S&P 500 index funds, they find that it is consistent with investor search costs and differential services offered across the funds. There is empirical support for their argument. For example, Khorana and Servaes (2011) examined the U.S. mutual fund industry from 1976-2009 and saw evidence of real price competition, finding, for example, that higher-fee fund families have lower market shares. And it is indisputably true that consumers do not lack for mutual fund choices (one recent tally finds 9000 mutual funds offered by 700 different sponsors), and that new entrants are common and successful. Finally, there is some evidence that fees are on the decline, which is what we would expect in a competitive market (Fisch 2010).

On the other hand, price dispersion in the mutual fund industry remains surprisingly high (Wallison and Litan 2007). In addition, most studies have found that the best predictor of a fund’s return is its expense ratio, meaning that higher fund fees *underperform* their competitors. Cooper, Halling, and Lemmon (2012) examined residuals from regressions of fees on various fund characteristics such that they were able to compare fees of highly similar funds. They found that fees are highly dispersed in ways that are inconsistent with a competitive market for mutual funds, noting among their results that lower-fee funds outperformed otherwise observably identical higher-fee funds by 32% over their sample. Empirically, the negative relationship between fees and returns has been borne out in the academic literature (Gil-Bazo and Ruiz-Verdu 2009; Haslem et al. 2007) as well as industry publications. Morningstar compared the predictive power of its star ratings (which take into account expenses as well as other variables) to expense ratios alone, and found that expense ratio alone was a better predictor of future fund performance than the star ratings in a majority of the years analyzed (Kinnel 2010).

The question of whether or not price dispersion is justified is bound up with another equally thorny problem for economists and investors alike, the question of whether or not it ever makes sense to pay more for expert managers or prestigious fund families given the efficient market

hypothesis. It is difficult to determine whether investors are irrational to pay more for a fund with a good track record. Empirical studies have been unable to determine the extent to which a particular mutual fund manager can consistently outperform the market and the question turns out to be surprisingly controversial in the academic literature. There is some evidence that *some* managers have superior stock-picking ability that persists over time (Kosowski et al. 2006; Baker et al. 2007). On the other hand, many other studies find that managers are not able to beat the market over the long run (Kahn and Rudd 1995; Carhart 1997; Bollen and Busse 2004). Indeed, some empirical studies have reported substantial fee dispersion even among identical funds or index funds in which performance does not depend on manager talent (Fisch 2010). Furthermore, even if some funds can consistently outperform the market, the percentage of funds that do so appears to be quite small, and it is unclear that the average retail investor is capable of identifying outperformers.

For purposes of this study, we are agnostic on the issue of whether past performance is correlated with higher returns, as well, for that matter, on the question of whether some high fund fees are economically justified. We proceed on the assumption that many investors would benefit from paying more attention to fund fees when choosing their retirement portfolios.

3. BEHAVIORAL FINANCE AND MUTUAL FUND FEES

Why are investors willing to pay higher fees? If we relax the assumption of rationality and allow that at least some investors are paying high fees when they should not, there are two broad kinds of psychological mechanisms that explain this widespread error. The first is that people may have explicit investment beliefs and strategies that are not compatible with a strong preference for lower fees—for example, a preference for strong past performance or a simplistic theory of diversification discussed in the first two sub-sections below. The second category of explanation for the fee-ignoring behavior is cognitive error (or miscalculation) biased in favor of underestimating fees, which we consider in subsections 3.3 and 3.4.

3.1 Performance-Centric Investment Strategy

One explanation for widespread disregard of fees, borne out in many surveys, is that investors have a conscious, deliberate approach to investing that prioritizes performance. For example, a 1996 survey found that the most common priority for mutual fund investors was identifying funds with good track records (Capon, Fitzsimons and Prince 1996). Wilcox (2003) showed profiles of different stock mutual funds to a panel of current mutual fund investors and asked them to select their preferred funds from each choice set. He determined the relative importance of a series of variables, including the one-year return, the ten-year return, the expense ratio, and the load. The bottom line was that investors preferred funds with strong past performance, paid some attention to load, and grossly discounted fees. In fact, many investors affirmatively believe that higher fees in particular lead to better performance (Weinberg 2002). Thus, investors who focus their attention on trying to predict which funds will outperform the market may either

ignore fees in favor of past performance, or may read a fund's fees as a good sign for future returns.

3.2 Diversification-Centric Investment Strategy

Another explicit investment strategy that might lead to undervaluing fee differences is one that focuses on diversification. Portfolio diversification is an entirely reasonable goal for investors, but substantial evidence suggests that investors poorly understand the idea of diversification and often allow it to crowd out other important considerations. Bernartzi and Thaler (2001) first demonstrated "naïve" diversification in a series of experiments. They found that subjects asked to make investment decisions would had a strong inclination to spread their money out, essentially investing $1/n$ into each of the n funds that were offered as investment choices irrespective of the particular choice set or the attributes of the options at hand.

Although this approach may be a useful heuristic, it can lead investors astray. For example, investing in multiple S&P 500 index funds as a means of diversification makes little sense, given that the funds will be, by definition, composed of exactly the same stocks. In addition, naïve diversification appears to lead investors to change their asset allocation preferences dramatically for no apparent reason. In the Bernartzi & Thaler study, for example, when the experiment manipulated the composition of the investment choices to increase the number of equity fund choices, subjects increased their allocation to stock funds by 25%. Naïve diversification is now well-documented across investments studies; for example, Beshears et al (2012) noted that simplified fee disclosure had no effect on the widespread naïve diversification they observed in their results.

3.3 Underestimating Effects of Fees on Returns

Subjects who whose goals and strategies are compatible with a fee-minimizing strategy may nonetheless ignore fees because informational and cognitive barriers to understanding mutual fund fees. On the informational front, presentations of fee information are confusing. It is hard for people to figure out which numbers on a prospectus are important. Commentators like John Haslem have observed that shareholders do not even have the information they need to be able to make efficient fund choices, because the expense ratio figure does not break out fees, expenses, and costs, and does not include all cost categories (2004). The SEC itself has argued that mutual fund prospectuses are written and presented in such a way that they are very difficult to comprehend.¹⁰

Even if improved disclosure requirements can make information easier to access, cognitive barriers may prove harder to overcome. There is ample evidence that retail investors find financial decisions especially difficult. Finance scholars Lusardi and Mitchell (2011) have

¹⁰ Enhanced Disclosure and New Prospectus Delivery Option for Registered Open-End Management Investment Companies, SEC Release No. 33-8861

conducted a number of surveys of financial literacy in the United States. They find that more than half of participants in a demographically diverse sample did not realize that mutual funds do not pay a guaranteed rate of return, and fewer than 20% could correctly answer a multiple-choice question about the calculation of compound interest. Given that the calculation of the effect of mutual fee funds involves an understanding of exponents, and potentially raises gain/loss framing complications, it should not be surprising to find that judging fees is particularly demanding. In support, a study from Finland finds that investors with greater intellectual ability, as measured by a traditional IQ test, are more likely to invest in lower-fee funds (Grinblatt, Ikaheimo, Keloharju, and Knupfer 2012).

Underweighting of fees is pervasive and sticky, robust to demographic variation and investor experience. Researchers have reported fee ignorance in samples of experienced investors (Wilcox, 2003), MBA students (Beshears et al., 2012), and elite college students (Choi et al., 2011). Even investors who would seem to have opportunities to learn from feedback over time continue to ignore fees; in a study of real mutual fund investments, Barber, Odean, and Zheng (2005) analyzed investors' decisions to invest new money into mutual funds for which they already owned shares. They found either no relationship between fees and additional investment or a “perverse” positive relationship—more investments in costlier funds.

One of the challenges in this area is to understand what it is about fees that makes them so easily overlooked, and what kinds of interventions might make them more salient. This is surprisingly difficult. Behavioral finance scholars like John Beshears, Brigitte Madrian, and James Choi have pioneered the experimental research agenda on fee salience and investor decision-making. Initial experimental research has tested the hypothesis that when fees are more salient—easier to find, distill, and compare—that investors will be more likely to take them into account. Beshears, Choi, Laibson, and Madrian (2012) asked subjects to allocate money toward a set of actively managed mutual equity funds and a set of actively managed bond mutual funds. Subjects were paid according to their portfolio performance, with an expected value of around \$100 for each subject. In one condition, subjects received the funds' statutory prospectuses—the long, traditional form of disclosure documentation. In another condition, subjects received a “summary prospectus”—a two-to-four page summary of key information including investment objectives, strategies, risks, costs and performance that was also available in the statutory prospectus.¹¹ Subjects who received the summary prospectus did not respond to fees more optimally, even though the summary made the fee information easier to find. Consistent with previous studies, the authors noted that subjects ranked fund performance, fund objectives, and desire to diversify as the most important factors for their investment choices.

¹¹ The SEC adopted the final version of a rule requiring funds to provide a summary prospectus, and specifying the information required in the summary prospectus in 2009. See SEC Release No. 33-8998, Enhanced Disclosure and New Prospectus Delivery Option For Registered Open-End Management Investment Companies, <http://www.sec.gov/rules/final/2009/33-8998.pdf>

One study that had some success in changing investor behavior both distilled *and* emphasized fee information. Choi, Laibson, and Madrian (2011) asked subjects to allocate \$10,000 among four index funds. The control group received only the funds' prospectuses. The Fees group received the prospectus plus a separate summary sheet showing fees and explaining how to calculate the costs over time. There was a small but significant effect of the Fees treatment on fees paid by staff and MBA students (though not by college students). In this study, the Fees treatment offered fee information that was easier to understand, along with an implicit prescriptive message—when fee information alone is separated and simplified for the subjects, they seemed to understand that they should attend to it.

3.4 Pilot Survey

Existing evidence suggests that it is surprisingly hard to get people to pay attention to fees, even when they are quite salient. The main study presented in this paper is based on an underlying intuition that people ignore fee information because fees appear to be so inconsequential. Fees are often presented in terms of fractions of a percent, rather than in dollar amounts, and, in order to estimate their true cost, people must have a sense of how compound interest works over many years. Although we find this explanation very intuitive, we found little explicit empirical support (perhaps because it seems so obvious). We conducted a small survey to test the extent to which investors' financial literacy contributes to their limited consideration of fees. In a 2-minute questionnaire, subjects were asked to estimate the difference between two 30-year investments of \$10,000 with an average (before fees) rate of return of 8%, one with a 1% fee and the other with a 2% fee.¹² The median response was \$3,000, and almost 40% of subjects underestimated the effect of the fee by an order of magnitude. This is clearly a very rough way to get a picture of how individuals approach the complex compound interest problem. Nonetheless, it supports a possible explanation for why investors do not change their behavior in response to simplified fee information: they do not think that fees, which seem very small, will have big effects on funds' returns. Even when they see the fees, they infer that fees present an all-things-considered trivial cost that can be safely ignored.

Our experiment, described in the next section, is in many ways a simpler version of the Choi et al. (2011) approach, taking into account our sense, confirmed by the pilot survey, that people think fees are too small to matter. Given evidence that simplification alone is not enough to convey the importance of fees, our study disaggregates the possible effects of emphasis and simplicity. We give all subjects fee information in simplified form in order to minimize the possibility that subjects are unable to distill or compare fee levels from the information presented

¹² The study was a short survey on Amazon Turk. 185 subjects were paid \$.75 and half received a bonus of a \$.25 bonus for above-average accuracy. Before seeing the main question, they were told, "When you buy shares of a mutual fund, as many people do when they choose a retirement portfolio, a percentage of the investment goes toward the mutual fund's annual operating expenses—in other words, mutual funds charge investors a yearly fee which is automatically deducted from investor accounts. In this task, you are being asked to estimate the total cost of a mutual fund's fees over a long time period." They were instructed to answer the question quickly, without using a calculator. The correct answer is approximately \$20,000.

in a prospectus. One way to make attributes more or less salient is to directly inform consumers that they ought (or ought not) to be paying attention to them, which is the approach we take in our experiment. We instruct subjects in one condition that fees are very important, making the prescriptive component very straightforward.

4. STUDY DESIGN

Broadly speaking, this study had two goals. The first was to get a general picture of how subjects went about collecting information about funds and then choosing a portfolio. The second was a comparison of subjects randomly assigned to either a standard instruction or an instruction that included information about the importance of fees. We begin our discussion of the research method with an overview of how the portfolio game worked, and then turn to the description of the experimental manipulation.

4.1 Design Overview

This study used a web-based user interface that permitted subjects to allocate a hypothetical \$10,000 among ten fictional mutual funds. The fund choices included two money market funds, two fixed income funds, two equity index funds and four actively managed equity funds. Investors were told that they were investing for retirement and that their final pay would be based on a simulated thirty-year performance of their chosen portfolio. Figure 1 shows the page that investors used to allocate their retirement account among the ten funds. The study did not allow investors to submit their selection unless their allocation totaled exactly \$10,000. The order of funds was randomized within asset category.

Subjects could click on a fund to learn more information about the fund's attributes. For example, a subject who clicked on the Fees button for Fund 5 would come to the screen pictured in Figure 2.

Figure 1. Fund allocation page

Please allocate your hypothetical retirement account of \$10,000 by designating the percentage that you wish to invest in each of the 10 funds below. Your allocations must total 100%. Press the submit button when you are done. You can click on each of the fund names for additional information about the fund.

FUND No	FUND TYPE	FUND NAME	ALLOCATION
1	Money Market Fund	The Jones Fund	0 %
2	Money Market Fund	The Smith Fund	0 %
3	Fixed Income Fund	The Skyler Fund	0 %
4	Fixed Income Fund	The Durns Fund	0 %
5	Equity Index Fund	The White Fund	0 %
6	Equity Index Fund	The Brown Fund	0 %
7	Managed Equity Fund	The Thomas Fund	0 %
8	Managed Equity Fund	The Hamlin Fund	0 %
9	Managed Equity Fund	The Lowe Fund	0 %
10	Managed Equity Fund	The Powell Fund	0 %
		Total	0

Submit

Figure 2. Fee information page, low-fee index fund.

THE WHITE FUND

This fund seeks to track the total return of the S&P 500 Index by investing in leading U.S. publicly traded companies from a broad range of industries.

Performance
Risk
Fees
Holdings

[Back to Fund Allocation page](#)

FEES

Expense Ratio as of 8/01/2011: 0.10%

The expense ratio is the total operating expenses of the fund. These fees are deducted from your account on an annual basis.

Each fund had information about its past performance (5-year, 3-year, and 1-year), its risk, its fees, and its holdings. A simplified presentation of the key fund attributes appears in Table 1 below.

Table 1. Fund attributes

Fund	Type	5-year return	Fees
1	Money Market	2.89%	.43%
2	Money Market	2.91%	.43%
3	Fixed Income	7.5%	.87%
4	Fixed Income	5.41%	.83%
5	Equity Index	8.67%	.10%
6	Equity Index	8.62%	.45%
7	Managed Equity	9.1%	.61%
8	Managed Equity	8.67%	.61%
9	Managed Equity	9.0%	1.62%
10	Managed Equity	9.7%	2.1%

After choosing how much to invest in each fund, subjects were required to complete a questionnaire that included demographic information as well as information on the subjects’ attitudes, experience and beliefs. As a manipulation check, subjects were also asked to identify whether a designated statement had appeared in the game instructions. Finally, subjects were asked to report on “the most important factor in my choice of retirement funds in this study.”

On the final page of the game, each subject received a message with a final portfolio value. The portfolio value was calculated using a rough algorithm simulating fund returns over thirty years and ranking returns by asset class. In light of the conflicting academic studies on the relative performance of actively managed funds compared to index funds, we structured the returns of our lowest cost index fund and actively managed fund to be the same on a fee-adjusted basis. After that, within comparable categories, the fund with a lower fee yielded a higher return—in other words, investors were rewarded for choosing the lower fee alternative.¹³

Table 2 shows the range of possible payouts as well as the degree of variation in fund fees.

¹³ Our performance algorithm also included a random component for some funds’ performance to reflect risk. This article does not analyze the risk component of our study.

Table 2. Distribution of possible fees and payouts

Maximum Portfolio Value (100% invested in highest performing fund)	\$76,120
Minimum Portfolio Value (100% invested in lowest performing fund)	\$15,630
Portfolio Value with 10% invested in each fund	\$38,989-49,543
Maximum Fee (100% invested in highest fee fund)	2.1%
Minimum Fee (100% invested in lowest fee fund)	.10%
Average fee (effective fee with 10% invested in each fund)	.81%

Overall, this study design has three key attributes. First, we used fictional funds based loosely on existing funds but changed to meet our design goals as needed. Using fictional rather than real funds reduced the risk that subjects might choose funds on the basis of brand recognition, independent familiarity with a particular fund or other criteria such as fund names.¹⁴ In addition, by using fake funds we could control the degree to which funds differed from each other. For example, the study included some fund pairs that were essentially identical on all but one dimension (e.g., fees).¹⁵

Second, our study required subjects to click through hyperlinks to open the windows to access the description of each fund. Further click-throughs provided more detailed information about each fund's performance, risk, fees and top holdings. Our study recorded each click. Using this design rather than a paginated prospectus enabled us to track the specific information actually viewed by each subject and to distinguish between the decision to access information and the role of that information in the subjects' decisions.

Third, we used a highly simplified presentation of each fund. The information presented was limited to fund type (money market, fixed income, equity index and managed equity), a description of the fund, and a single window providing information separately for each of four categories – performance, fees, risk and holdings. With respect to fees, for each fund, we presented subjects with a single number reporting the fund's expense ratio, as shown in Figure 2.¹⁶ The design was intended to facilitate subjects' ability to compare the attributes of one fund to those of another. As noted above, several studies have sought to analyze investor responses to disclosures. Our study was specifically constructed to reduce the likelihood that investor choices were due to confusion or inability to understand the fee disclosure.

4.2 Subjects

¹⁴ We gave our funds generic names, i.e., the Smith Fund, to attempt to avoid the possibility that investors would infer information about fund style or strategy from the names of the funds. See Cooper (2005) (finding investors directed money into funds that changed their names to reflect a "hot investment style").

¹⁵ We also varied the order in which the funds appeared, within their fund type, on the allocation page.

¹⁶ Our description of fund fees did not include loads, 12b-1 fees, sponsor fee waivers or other expenses.

We used two subject pools. Table 3 contains basic demographic information on each group of subjects. One group of subjects was made up of undergraduate and graduate students, and some staff, who took the study at the University of Pennsylvania’s Wharton Behavioral Lab (WBL). The Wharton Behavioral Lab draws subjects from across the University of Pennsylvania campus, primarily undergraduates. Its subjects are not confined to students affiliated with the Wharton business program.

The other group of subjects took the study online, signing up through Amazon Mechanical Turk (MTurk). Although some scholars have raised questions about the external validity of online subject pools like Amazon Turk that pay subjects very small amounts for small tasks and short questionnaires (Falk & Fahr 2003),¹⁷ others have found that it is comparable to other survey panels.¹⁸ Our goal in this study was to simulate the allocation decision faced by ordinary employees choosing among investment options in their 401(k) plan. Using subjects who may have below-average means or sophistication is somewhat appropriate for a study that seeks to describe and address the investment choices of employees with little specialized knowledge or investment experience.¹⁹

Table 3. Subject demographics, by subject pool.

	MTurk	WBL
Total number of subjects	197	201
Median age	32	20
Percent female	52%	67%
Percent owning a mutual fund	43.1%	12.9%
Percent who have a retirement account	54.9%	8.5%
Percent with college education	58.4%	33.8%
Percent reporting somewhat to very stable income	67.0%	71.6%

We incentivized our subjects to select funds carefully by providing a performance-based bonus. Amazon Turk participants were paid a base rate of \$1 for completing the study and an additional \$1 bonus if their portfolio value was above the median in that subject pool. Subjects who participated in the study via the Wharton Behavioral Lab were paid a \$10 show-up fee for a session that included this experiment as well as other studies. They were instructed that they

¹⁷ See also Fehr and List (2003) (finding differences in the behavior of students and CEOs in studies concerning the effect of incentives).

¹⁸ U.S. workers on Mechanical Turk are arguably closer to the U.S. population as a whole than subjects recruited from traditional university subject pools (Paolacci et al. 2010).

¹⁹ We note that the self-reported education level of Mechanical Turk subjects is higher than that of the general population (Paolacci et al. 2010).

would also receive a bonus payment proportionate to their total portfolio value at the end of the session—one dollar for every \$10,000 in their portfolio (rounded to the nearest quarter).

4.3 Instruction Conditions

We sought to examine the effect of providing subjects with an instruction focusing them on the importance of mutual fund fees. We did so by varying a component of the study instructions, using an incentive-compatible investment game. Subjects were randomly assigned to one of three possible conditions: Performance, Fees, or Control. After subjects logged in to the fund study site, they read a page of instructions. In addition to basic information about the purpose and design of the study, subjects in the Fees condition read an additional instruction:

In making your investment decision, you may want to consider the following information: The most important single factor in mutual fund performance is the fund's operating expenses (in other words, its fees).

Subjects in the Control condition did not receive any additional instruction. Subjects in a third condition, the Performance condition, read an instruction about the relationship between past performance and future returns.²⁰ For the purposes of the present analysis, we will focus almost entirely on the comparison between the Control group and the Fees group, excluding subjects who saw the Performance instruction. In the portion of the study analyzed here, we sought to test whether subjects who received the fee instruction behaved differently from those in the control group.²¹ We organize our predictions into three main hypotheses.

Hypothesis One: Subjects who read an instruction about the importance of fees will be more likely to seek information about fund fees, and will therefore click more on fee links.

Hypothesis Two: Subjects who read an instruction about the importance of fees will be more likely to report that fees are important for returns.

Hypothesis Three: Subjects who read an instruction about the importance of fees will a) choose lower-fee funds and b) move away from an evenly distributed portfolio (e.g., away from naïve diversification).

5. RESULTS

Data is drawn from 197 Amazon Turk responses and 201 University of Pennsylvania respondents. Because of the baseline differences between our subject groups, we report results separately, although the groups had similar final fund values, and similar patterns of investment. Table 4 gives basic data for subjects' clicking behavior and portfolio composition, for both

²⁰ They read, "In making your investment decision, you may want to consider the following information: studies have shown that past performance does not predict future returns."

²¹ We report results here comparing the Fee condition group to the Control group. We do not analyze the behavior of those subjects who received the performance instruction – those results are considered in a separate paper.

subject pools. Overall, Turk subjects clicked fewer links and were marginally less likely to accurately recall the content of the instructions they had read.

Table 4. Basic descriptive means, by subject pool

	MTurk	WBL
Minutes logged in	12.7	11.3
Total clicks	34.3	59.0
Mean clicks on fees	6.86	11.77
Mean clicks on risk	4.70	9.32
Mean clicks on holdings	3.25	7.08
Mean clicks on performance	7.98	13.76
Total number of funds invested in	7.33	6.89
Percent Investing in all 10 funds	27.9%	32.4%
Percent correctly identifying own condition	49.2%	57.2%
Average portfolio value	\$47,679	\$48,839
Average pay	\$1.50	\$4.91

MTurk respondents also reported being more comfortable and confident with their ability to make good financial decisions. Notably, however, subjects in both groups expressed discomfort with investing. On a seven-point scale (where 1 is highly disagree and 7 is strongly agree), MTurk respondents rated their confidence with financial decisions at 3.5 and their discomfort at 4.4. WBL respondents rated their confidence at 2.4 and their discomfort at 5.1.

The experimental manipulation of interest for this paper is the presence or absence of the special fees disclosure. For purposes of this analysis, we compare the responses of the 72 WBL subjects assigned to the Fees condition with the responses of the 60 subjects assigned to the Control condition. We separately compared, for the MTurk subjects, the responses of 64 subjects in the Fees condition to 65 in the Control condition.²² Because of the potential relationship between fees and performance described earlier, we do not include in this comparison those subjects who received the Performance condition.²³ All statistical tests reported here are two-sided t-tests,

²² We also analyzed sex differences. Men and women in the Wharton subject pool did not differ on any of the primary dependent variables, including portfolio composition and clicking patterns. Women in the Turk pool invested significantly more in safe (fixed income) funds than men. (34.8% vs. 27.4% for men) ($p=.015$).

²³ As a general matter, the behavior of those subjects who received the performance instruction was similar to that of the control group. For our primary variables, including fee clicks, average fee paid, the importance of fees and investment in the lowest and highest fee funds, the results of the performance group were statistically

comparing the variable means across conditions. We report the results of the main statistical tests of significance in tables, including means, t-statistics, degrees of freedom, and p-value.

5.1 Search for Information: Fee Clicks

The first hypothesis we tested was about search: how did the fee instruction affect the search for information about the funds? The fee disclosure had a significant impact on how subjects collected and used fee information. As Table 5 indicates, subjects in the Fees group were much more likely to look at a fund’s fees. On average, WBL subjects in the Fees group clicked 40% more on the fees buttons, meaning that they viewed fee information 40% more often, than subjects in the control group. The increase was even more dramatic for subjects from the Turk pool, where those in the Fees group clicked more than twice as often on the fee disclosure than subjects in the control group. In both subject pools, the Fees instruction caused investors to search for more fee information than the control group.

Table 5. Fee Clicks by Condition, for WBL and MTurk samples

	Fee Group Mean	Control Group Mean	T	Df	p
Fee Clicks: WBL	14.82	10.40	3.10	129.62	.002
Fee Clicks: MTurk	9.36	4.09	4.37	101.87	.000

5.2 Beliefs and Attitudes about Investing

Our second hypothesis was that the fees instruction would be a real update to subjects’ beliefs about fund fees, and the data reveal that the fees instruction did affect subjects’ beliefs about the importance of fund fees. Group means and significance statistics are reported in Table 6 for WBL participants, and Table 7 for Turk participants. The effects were very similar across subject pools. Overall, in both subject pools, subjects in the Fees condition were less likely than subjects in the Control group to agree that a fund’s fees do not affect returns and were substantially more likely to report that operating expenses were the most important factor in fund performance. The most dramatic impact of the fee instruction was on the subjects’ self-reported identification of the most important criterion in their selection among the investment alternatives. In both subject pools, the instruction caused a significant reduction in subjects reporting diversification as the most important consideration, and a corresponding increase in the percentage of subjects reporting that fees were the most important consideration. Notably, the fee instruction appeared to be new information to the Turk subjects as well as the Wharton students despite the fact that the Turk subjects were significantly more experienced investors, with over half reporting that they have a retirement account.

indistinguishable from the control group. The performance instruction did generate marginal differences in the investors’ allocation among the various funds.

Table 6. Beliefs and preferences by condition, WBL subjects

	Fee Group Mean	Control Group Mean	T	Df	p
Fees do not affect returns	3.04	3.53	1.97	129.99	.051
Operating expenses most important in performance	4.31	3.16	4.38	129.35	.000
Most important is fees	27.8%	6.7%	3.39	114.67	.001
Most important is diversity	30.6%	53.3%	2.68	121.53	.008

Table 7. Beliefs and preferences by condition, MTurk subjects

	Fee Group Mean	Control Group Mean	T	Df	p
Fees do not affect returns	2.61	3.48	3.43	124.22	.001
Operating expenses most important in performance	4.28	3.25	4.75	85.95	.000
Most important is fees	35.9%	4.6%	4.75	85.95	.000
Most important is diversity	31.3%	50.8%	2.27	126.55	.024

5.3 Fund Selection

Our third hypothesis was that the fee instruction would affect fund choice, and this is arguably the most important hypothesis in terms of real-world impact. Because our study contained funds with multiple attributes, we were able to address this question in several ways. With few exceptions, the instruction affected our subjects' allocation choices. Results are summarized in Table 8 (WBL) and Table 9 (MTurk).

First, for each subject, we determined the asset-weighted average mutual fund fee that the subject's account would have paid at the time of the subject's investment allocation.²⁴ A subject who invested half of his or her money in a fund with a .1% fee and half in the fund with a 2.1% fee would have had an average fund fee of 1.1%. By this measure, for both subject pools, the fee instruction had a clear impact. In both pools, subjects in the Fees group selected portfolios charging a lower average fee than subjects in the Control group.

The fee instruction affected the subjects' choices among specific investment alternatives. The Fees group invested a higher percentage of their portfolio in the lowest-fee fund option and a lower percentage of their portfolio in the highest-fee fund than the Control group. They also

²⁴ The average fee would vary over the thirty years of the simulation because of the effects of differences in fund performance.

invested more in index funds and less in managed funds than their Control counterparts. Notably, those in the Fees group invested more in the lower-fee index fund than those in the Control group, but did not invest more in the higher-fee index fund than those in the Control group, suggesting that their investment shift resulted from a concern about fees rather than a preference for passive instead of actively managed funds.

Table 8. Fund selection by condition, WBL

	Fee Group Mean	Control Group Mean	T	Df	p
Average Fees Paid (asset-weighted)	.66%	.80%	3.27	129.50	.001
Index Funds (5-6)	34.12	25.55	2.70	129.77	.008
Managed Funds (7-10)	40.81	48.40	2.46	129.90	.015
Fixed income funds (1-4)	25.06	26.05	.33	128.68	.739
Average Percent of Portfolio Invested in Lowest-Fee Fund	23.5	15.7	3.18	119.20	.002
Average Percent of Portfolio Invested in Highest-Fee Fund	7.15	11.42	2.31	115.34	.022

Table 9. Fund selection by condition, MTurk

	Fee Group Mean	Control Group Mean	T	Df	p
Average Fees Paid (asset-weighted)	.68%	.79%	2.21	125.60	.028
Index Funds (5-6)	29.76	22.45	2.01	118.4	.047
Managed Funds (7-10)	38.65	46.85	1.93	120.41	.056
Fixed income funds (1-4)	30.69	31.59	.235	124.39	.814
Average Percent of Portfolio Invested in Lowest-Fee Fund	21.1%	13.9%	2.17	115.94	.032
Average Percent of Portfolio Invested in Highest-Fee Fund	7.55%	10.42%	1.38	126.08	.170

5.4 Diversification

We considered the extent to which the fee instruction affected the propensity of the subjects to engage in a naïve diversification strategy. Table 10 shows the comparison of the concentration of funds by condition, using the concentration measure described in Beshears, et al. (2009) based

on each fund’s Euclidean distance from the even distribution.²⁵ This concentration measure assesses the extent the degree to which a subject’s portfolio differed from the naïve 1/n investment strategy.²⁶ For both subject pools, subjects in the Fees group had more concentrated portfolios than those in the Control group—that is, their portfolios were less like the paradigmatic naïvely diversified allocation.

Table 10. Concentration of investments, by condition, for both subject pools

	Fee Group Mean	Control Group Mean	T	Df	p
Concentration: WBL	.333	.287	1.98	128.47	.050
Concentration: Amazon Turk	.376	.315	1.75	122.78	.082

5.5 Robustness: Subjects with Investment Experience

In our last analysis, we take up the question of how the fee instruction affects a particular sub-group of subjects who we might predict would be less in need of investor education. Because the Amazon Turk subjects were not primarily drawn from a student population, we looked at some experimental effects on the sub-group of the sample that had investment experience. Of the 197 Turk subjects, 54.8% reported that they had a retirement account for which they made investment decisions. Noting at the outset that tests of the experimental manipulation on this sub-group are less powerful because the sample size is smaller, we found that the fee instruction made a difference even when investors were not entirely new to investing. Looking only at experienced investors, the fee instruction increased their clicks on fee links from 3.9 to 8.7 ($t=3.14$, $df=58.12$, $p=.003$). Those who saw the fee instruction paid a significantly lower total fee (.63% vs. .75%) than those in the control group ($t=2.13$, $df=71.00$, $p=.037$). The instruction made them invest slightly, though not significantly, more in the lowest-fee fund ($p=.237$) and slightly less in the highest-fee fund (mean difference=3.8%, $t=1.85$, $df=64.16$, $p=.069$). Experienced subjects in the Fee group were also much more likely to report that the most important consideration was operating expenses compared with experienced subjects in the Control group (percent difference=30.8, $t=3.46$, $df=48.84$, $p=.001$).

6. DISCUSSION

²⁵ Concentration is measured by the square root of the sum of the squared differences between the actual allocations and the even distribution (.10, .10, .10, .10, .10, .10, .10, .10, .10, .10). The most diversified portfolio would be zero, and the most concentrated portfolio (100% in one fund, 0 in 9 funds) is $\sqrt{9/10}$, or .949.

²⁶ We also measured diversification using the Herfindahl-Hirschman index, typically employed to measure the concentration of market power in an industry, which simply sums the squared percentage allocated to each fund. This measure also yielded statistically significant differences in concentration by condition, at $p=.028$ for the WBL subject pool and $p=.067$ for the Turk pool.

Based on the results of our mini-survey, we assumed that investors routinely underestimate the importance of fees and predicted that investors who did not understand the real cost of mutual fund fees would not gather fee information, much less use it to make fund choices. We found that, by contrast, when subjects were explicitly told that fees matter, the instruction had the effect of changing how they searched, what they believed, and which funds they invested in. Subjects in the fees group affirmatively searched for more fee information, believed that fee information is important, and incorporated fee information into their investment choices. The instruction affected both subject groups and changed the behavior of experienced investors as well as novices.

Overall, our results suggest that informing or educating investors about fund fees can have a real impact on their beliefs about retirement planning, the information they gather in preparation for decision-making, and the investment choices they make. Several key factors distinguish our approach, and conceivably our results, from the existing literature. First, our fee instruction is designed to alter subject beliefs and preferences by providing subjects with new information that fees matter (and matter a lot) in determining portfolio returns. We suspect that the impact of the instruction on actual investment choices is, in part, a function of a study design which simplified the presentation of fee information. Second, subjects in our study were told both that fees are important and presented with comprehensible fee information. The fees in our study were clearly labeled, consisted of a single variable and were presented in a uniform format. Subjects in our study did not need to compare different types of fee structures; nor did they need to search multi-page documents to locate all relevant fee information. Thus our study made it easy for subjects whose beliefs were affected by the fee instruction to act on those beliefs. Third, because our study allowed us to monitor the search process, we know both what information investors looked and how they used that information.

The willingness of our subjects to behave differently in light of the fees instruction suggests that the instruction provided credible, novel information. This finding is in contrast to the Mercer Palmiter & Taha (2010) study finding that the SEC's mandated disclaimer warning investors that "past performance ... cannot guarantee future returns" had no effect on subject behavior. Our intuition is that instructing subjects with respect to the significance of past performance is more complex for reasons that we explore in other work.

We also highlight some of the more troubling findings from this study. Our findings support the naïve diversification hypothesis in general. The average subject invested in seven funds, and a plurality of subjects in both samples invested some money in all ten funds. In the Control condition, subjects in both samples were most likely to report that the most important factor in the decision-making was diversification. Although the fees instruction increased fund concentration slightly, subjects still favored a broadly diversified approach.²⁷ For example,

²⁷ Our subjects' preference for diversification was particularly troubling in that three of our sample funds (funds 5, 6 and 8 in table 4) reported virtually identical past performance and holdings, varying only with respect to fees; two of

although subjects in the Fees group moved money into the lowest-fee fund, they nonetheless kept money in the nearly identical higher-fee index fund.²⁸ To the extent that investors do not fully understand the rationale for diversification or the methodology for diversifying effectively, this belief may also lead to inferior investment decisions. We note that subjects in both conditions endorsed the statement “It is very important to have a diverse portfolio” equally heartily, with mean ratings well over 5 out of 7 irrespective of condition, in both subject pools. We speculate that although the fee instruction gave subjects a basis for selecting funds other than diversification, it did not clear up their general misconceptions about what it means to have a diverse portfolio.

7. LIMITATIONS AND NEXT STEPS

Any experiment like this one faces a number of constraints on generalizability and concerns about external validity. The low-stakes problem is perhaps the most important. Most (though not all) incentive-compatible behavioral decision research faces this problem, which is that it is hard to extrapolate patterns of behavior that subjects exhibit with five-dollar stakes to real-world decisions involving significant wealth. This is of particular concern for this study, because retirement investing is one of the highest-stakes decisions that most people make. It would not be a surprise to find that people do significantly less research when preparing to earn two to seven dollars in a lab game than when preparing to save hundreds of thousands for retirement, and we are not claiming otherwise. On the other hand, this effect should, if anything, bias our study toward a non-result. If a fee instruction changes behavior in an experiment in which the subject’s incentive is limited to a few dollars, the magnitude of the effect should only be stronger in a real world situation in which the stakes are substantially higher.

Our study design raises additional generalizability concerns, particularly with respect to the specific form and content of the instruction. On the one hand, it is heartening to see a disclosure that works. Unlike many disclosures, the fees instruction seems to be something that people can follow, for a few possible reasons. It is an instruction that is easy to apply—it refers to information that is readily available (fund fees) and requires a very simple numeric calculation (comparison of values). It asks subjects to seek new information and use it, rather than to ignore information that has already been collected. The latter is very hard, but the former is not. And it is a fairly emphatic instruction, that aims to convey both the information about fees and the importance of that information for investors.

the three – the two index funds – varied only on the fee dimension. We had hypothesized that, at least with respect to these funds, the fee instruction would cause subjects to shift assets into fund 5. Our results demonstrate that, while this shift occurred, it was only partial, and that subjects did not reduce their investment in the “irrational” alternative funds.

²⁸ The two funds were constructed to have the same holdings and investment strategy, but the higher fee fund reported slightly lower past performance (reflecting the higher fees). Given that the two index funds were virtual substitutes, there could be no reason for choosing the higher fee index fund.

On the other hand, some of the reasons this instruction was easy to follow may be missing in the real-world investing context. The salience of the fees instruction in our study was likely increased by the relatively limited amount of information and instruction provided. Real world mutual fund disclosure is considerably more complex. Furthermore, many investors fail to read disclosures at all, an ongoing regulatory concern²⁹ that is heightened for investors who rely on the advice of a broker or financial advisor.³⁰ Although the SEC has made repeated efforts to refine and simplify mutual fund disclosure, particularly with respect to fees, the problems of access and comprehension persist.³¹ On the other hand, on-line investment resources such as Morningstar and Yahoo Finance as well as some mutual fund companies such as Fidelity and Vanguard reduce search costs by providing click-through information that enables investors to find and compare fees and to evaluate the impact of fee differentials over a period of years. The availability of this information suggests that, even outside the laboratory format, if investors are educated about the importance of fees, they have access to sufficient information to enable them to act upon such an instruction.

In our study, the instruction was offered early enough that it could affect search. In contrast, the SEC's approach, which has focused on highlighting the importance of fees on the page with fees information may help those who make it to that page, but it does not encourage people to search for that information in the first place. In addition to the placement of the instruction, the content of our fee instruction may be controversial enough that it would be unacceptable to regulators, and a weaker statement about the relative importance of fees may not have the same effect. In sum, the timing, placement, language, and context of any fees instruction will change its effect on consumer behavior.

Finally, this study did not investigate the interaction of the fees instruction with the form and complexity of fees. That interaction may prove crucial for the usability of this kind of disclosure. A typical display of fee information includes the expense ratio, the 12b-1 fee, the redemption fee, and the sales load. In addition to the stated fees, the display may also reflect temporary "fee waivers." The full mutual fund prospectus disclosure of fee information is even more complicated, showing ten to fifteen different numbers including maximum sales charge, management fees, acquired fund fees and "other expenses" before the bottom line of total annual fund operating expenses. Some additional expenses are not even included in this bottom line

²⁹ See Investment Company Institute (2006) (survey reporting that only thirty percent of recent mutual fund investors consulted shareholder reports before their most recent purchase, and only thirty-four percent used the fund prospectus).

³⁰ See Investment Company Institute (2003) (reporting that, as of 2003, approximately 80% of mutual fund purchases were made through a financial intermediary such as a broker).

³¹ The SEC extensively revised its mutual fund disclosure requirements in 2009 by introducing the summary prospectus. Enhanced Disclosure and New Prospectus Delivery Option for Registered Open-End Management Investment Companies, Securities Act Release No. 8998, Investment Company Act Release No. 28,584, 74 Fed. Reg. 4546, 4549 (Jan. 26, 2009) (to be codified at scattered parts of 17 C.F.R.). Notably, Beshears et al. (2009) specifically test the effect of the summary prospectus on investor decisions with respect to loads and find that the disclosure changes do not reduce investor errors in fund selection.

number, the most notable being trading commissions. In order for any kind of instruction about the importance of fees to affect behavior, investors would need to locate and evaluate the disclosure correctly. Although on-line tools may simplify this analysis, more research on this question is needed.

Critical questions for future research include the extent to which our findings extend beyond fees to other components of investment decision-making, the interaction between the instruction and the complexity of the information to which the instruction relates, the impact of varying instruction strength and salience, and the extent to which instructions can overcome existing investor biases.

8. CONCLUSION

Many studies have identified biases or mistakes in consumers' real world investment decisions. The regulatory changes that have increased individual consumer responsibility for retirement savings and investment choices magnify the consequences of these mistakes. The extent to which disclosures, investor education, or other strategies can address these mistakes is a critical policy concern. Indeed, Section 917 of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 requires the Securities & Exchange Commission to conduct a study of investor financial literacy with the specific regulatory objective of improving disclosures necessary for retail investors to make informed financial decisions.³²

This study has explored one potential strategy for improving investor decision-making: using a simple instruction to educate investors about the big impact of fees on returns. Although scholars have long advocated improved investor education (Fanto 1998; Lusardi and Mitchell 2011), the practicality and effectiveness of proposed reforms have been questioned (Mandell and Klein 2009).

The results of this study support some preliminary optimism about the efficacy of a fees instruction. Information about the real impact of fees on returns is news to at least some and maybe many investors. Furthermore, it is news they can use. When fee information is presented simply and transparently, educating investors about the importance of fees updates their investment beliefs, motivates more thorough research into their options, and yields higher-value investment choices.

³² See Securities & Exchange Commission, Jan. 18, 2012. Comment Request for Study Regarding Financial Literacy Among Investors Release No. 34-66164, <http://www.sec.gov/rules/other/2012/34-66164.pdf> (requesting public comment in connection with study of investor financial literacy).

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