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Investor Testing on Registered Investment Company Fee Meters

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Executive Summary

Open-end funds (including mutual funds and exchange-traded funds or “ETFs”) offer investors portfolios that can help them achieve their investment goals. The Securities and Exchange Commission (SEC) regulates the disclosures provided by these funds to help ensure that investors have the information they need to make informed investment decisions. Such disclosures require information about the fund’s objectives, risks, fees, and other attributes. Current disclosure requirements do not require funds to provide *comparative* fee information, however. Comparative fee information may help investors understand whether the fees charged by a given fund are high relative to others in the market, and whether it may be in their interest to search for a different fund. This research examines the impact of providing investors with a graphical display that highlights mutual fund fee price dispersion and relative costs. We refer to this display as a fee meter.

In this research, we conduct two studies to answer the following questions:

1. In the absence of relative cost information, how accurate are U.S. consumers’ estimates of the relative cost of S&P 500 index mutual funds? (Study 1)
2. Do mutual fund fee meters improve consumers’ estimates of the relative cost of mutual funds? (Study 2)
3. Are relative costs a mechanism for the effect of fees on willingness to pay (WTP) to search for an alternative fund? In other words, are differences in WTP across funds with different fees driven by investors’ beliefs that these funds are *relatively* high or low cost? (Study 2)
4. Further, do fee meters moderate the relationship between fees and WTP to search for an alternative fund? Specifically, is there a stronger relationship between fees and WTP to search among consumers viewing fee meters (vs. those not viewing fee meters)? (Study 2)

Background

It is important for investors to understand price dispersion in the mutual fund market so that they can make informed decisions about mutual funds. Research demonstrates historical dispersion in fees for S&P 500 index funds (Hortaçsu & Syverson, 2004; Scholl, et al., 2023). In 2024, we found that the fees on no-load, non-institutional S&P 500 mutual funds available to consumers ranged from 0% to 1.61% per year. There is also significant dispersion of fees within and across broader sets of mutual funds (Cooper, et al., 2021; ICI, 2023).

Price dispersion is important because it suggests that consumers who search the mutual fund market may find lower cost alternatives, including the possibility of alternatives that have a similar investment strategy and risk profile. Although, in theory, higher costs could be offset by non-financial factors (e.g., customer service), there is little empirical evidence to justify higher fees from a financial perspective. Across settings and over time, higher fees are associated with

lower net returns (Choi, et al., 2010; Cooper, et al., 2021; Elton, et al., 2004; Fama & French, 2010; Scholl, 2022). In the case of index funds, previous research has argued that fees are the only materially varying factor between the funds (see, for instance, Choi, et al., 2010; Elton, et al., 2004; Scholl, 2022). If the S&P 500 index rises by 10% in a given year, the highest-fee mutual fund (with an expense ratio of 1.61%) would earn about 8.39% that year, whereas the lowest-fee fund (with an expense ratio of 0%) would earn about 10% that year. In subsequent years, investors remaining in the high-fee fund could additionally forgo earnings on the money lost to fees, meaning that differences in fees may compound over time.

Providing consumers with information about the distribution of fees may spur them to search for less expensive funds. Past research conducted by Scholl, et al. (2023) suggests that fee information may help consumers choose among a group of mutual funds, but it remains unknown if providing relative cost information for a single fund will help consumers decide when it is in their interest to search for a cheaper fund. The current research addresses that limitation.

Finding the optimal fee meter requires many design decisions. Looking across graphical comparative displays provided in other contexts, the graphics used may be continuous or discrete, may provide information about the cutoffs between categories, and in some cases, may provide normative evaluations. The current paper examines three fee meter design variants, which provide increasing amounts of information to consumers about the distribution of fees: a continuous meter, a discrete meter that divides the continuous meter into equal sections, and a labeled continuous meter that provides information about the fee levels at each break point.

Key findings: Study 1

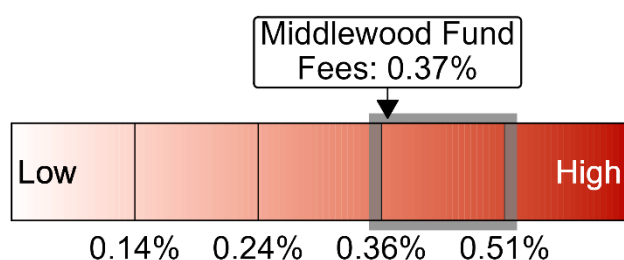
In Study 1, we conducted a nationally representative survey of 1,017 people where we provided them with an example of a mutual fund fee (each participant was shown one of four different example fees) and asked them how many funds out of 100 would have fees lower than the example fee. The example fees ranged from 0.08% to 0.49%, representing the 15th to 77th percentiles in the true distribution.

In the Absence of Relative Cost Information, U.S. Consumers Do Not Accurately Estimate the Relative Cost of S&P 500 Index Funds.

Regardless of the example fee provided, participants' estimates of the percentiles were not sensitive to the expense ratios. Without context, participants estimated that all four example fees were roughly in the 40th percentile of cost. We found no differences in response patterns by participants' investor status, mutual fund ownership, and subjective knowledge of mutual fund fees. These findings suggest that participants are not aware of relative costs in the mutual fund industry and that an informational display containing this information may be helpful for investors.

Key findings: Study 2

In Study 2, we conducted a survey of a nationally representative sample. Participants were provided with information about a hypothetical S&P 500 mutual fund including: the objective of the fund, fees, risk factors, and performance. Our final sample included 4,424 participants. Participants were randomly assigned to one of four different presentations of the fees and one of five different levels of fees. The first factor captured the four fee meter conditions: no meter (text only), a continuous meter, a discrete meter that adds five categories to the continuous meter, or a labeled meter that adds information about the fees at each category boundary. In all meter cases, the fee assigned to the participant was shown at the appropriate percentile in the meter. An example of the labeled meter is shown here (all meters are shown in Appendix C):



Similar to Study 1, participants were asked to assess for a given fee level, how many funds out of 100 S&P 500 funds would have lower fees. We refer to this measure as the cost percentile estimate. To understand whether participants would want to search for a different fund, we asked them to consider how much they would be willing to pay to see another fund.

We focus our analysis on how perceptions of relative costs influence the WTP to search for another fund. In the case of an index fund, those who believe that their initial fund is relatively expensive should be willing to pay more to search for a cheaper fund, whereas those who believe their initial fund is relatively inexpensive should be willing to pay less to search for a cheaper fund.

Fee Meters Improve the Accuracy of Relative Cost Estimates

On average, participants in all of the fee meter conditions were more accurate about the relative cost of their assigned fee than those in the text-only condition. However, the characteristics of the meter (continuous, discrete, labelled) did not have a significant effect on participants' cost percentile estimates.

Relative Costs Affect WTP to Search for an Alternative Fund

When focusing on the relationship between the perceived relative costs and WTP to search, we find that for a one-percentile increase in cost percentile estimates, WTP to search increases by 84 cents. Because fee meters change cost percentile estimates, they also indirectly affect WTP to search.

Fee Meters Moderate the Fee–WTP Relationship

In addition to the indirect effect operating through cost percentile estimates, we are also interested in the total effect of the fee meters on WTP. Although WTP to search is greater for participants that saw a meter, there is a lot of variation in these responses. In particular, differences between participants in the meter conditions and those in the text-only condition are only statistically significant for fee levels in the middle of the distribution.

Conclusions

Overall, we find that, in the absence of additional information, consumers are not knowledgeable about the distribution of costs in the mutual fund market (Study 1). Providing them with comparative fee information in the form of a meter substantially improves their understanding of relative costs; in turn, this improved knowledge increases WTP to search for an alternative fund (Study 2). However, the increases in WTP were small.

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1. Introduction

Investors use investments in the \$25 trillion U.S. mutual fund industry¹ to pursue important life milestones. To help ensure that investors make informed decisions about these products, regulations require mutual fund companies to disclose information about fund objectives, risks, fees, and other attributes.² Disclosures that do not provide additional context may fail to help investors evaluate and interpret disclosed information. Unless investors understand that the fees on a fund are high relative to other funds, for instance, mutual fund fee disclosures may not spur comparison shopping. Current disclosure requirements do not require funds to provide *comparative* fee information, which raises questions about whether investors fully understand mutual fund costs. This research examines the effects of a graphical display that highlights mutual fund fee price dispersion and a fund’s relative costs (hereafter known as a “fee meter”).

We concentrate on mutual fund fees for two primary reasons. First, price dispersion is common within the mutual fund industry, suggesting that investors who search for an alternative may be able to find a cheaper fund, including funds that are similar in terms of investment strategy and risk profile. Second, fees are a crucial component of total net returns that investors receive. Research shows that fees and net performance are negatively related, making it difficult to justify paying high fees from a financial perspective, particularly in the case of index funds that do not differ significantly in terms of investment strategy, risk, or gross return. Furthermore, because many mutual fund fees are charged periodically based on a portfolio’s value, the consequences of holding an expensive fund grow over time.

Mutual Fund Fees Vary Considerably

Fees vary considerably across mutual funds. For S&P 500 index funds, Hortaçsu and Syverson (2004) document dispersion from 1995 through 2000, as do Scholl, et al. (2023) for every fifth year from 2001 through 2021. The latter also show that expense ratios (mutual fund fees expressed as a percent of the investment) on S&P 500 index funds, which track the same index and therefore have similar risk and gross return, vary from 0.02% to 2.31% as of December 1, 2022. This spread in expense ratios means that an investor could pay over 100 times more for one mutual fund than they pay for another, even though the funds are otherwise similar.

Mutual fund price dispersion is also common outside of S&P 500 index funds. Using a regression analysis, Cooper, et al. (2021) analyze equity mutual funds between 1980 and 2017. They document that the interquartile spread in unexplained reported annual expenses (i.e., the difference between the 25th and 75th percentiles) is 0.23% for all equity index funds and 0.47%

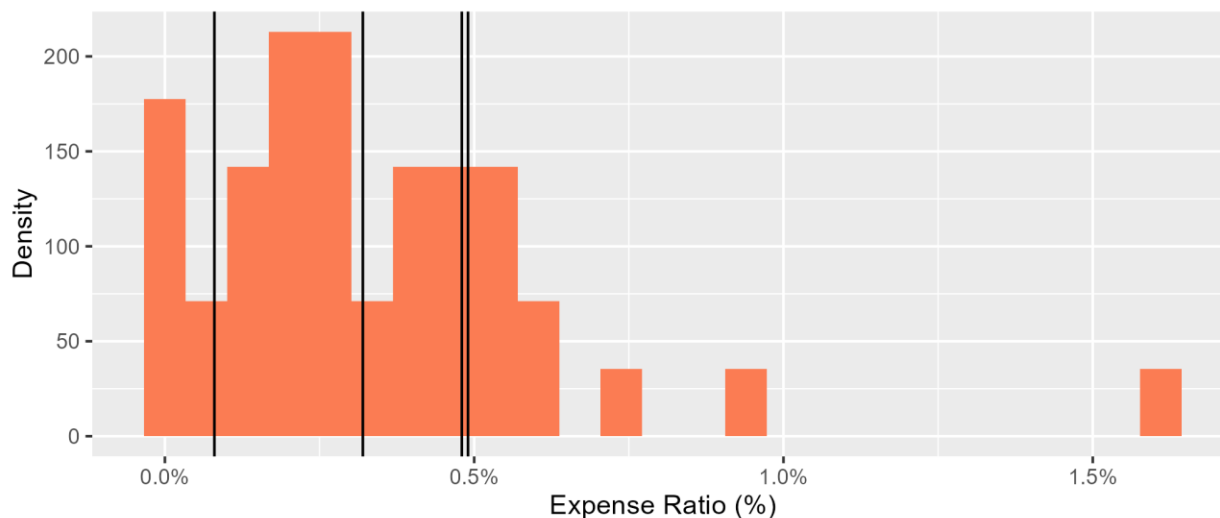
¹ For the Investment Company Institute, Collins et al. (2024) estimates that there were \$25,519 billion invested in mutual funds as of year-end 2023.

² See Form N-1A, the registration form for mutual funds and other open-end management investment companies, at <https://www.sec.gov/files/form-n-1a.pdf>.

across all styles of equity funds. In a complementary analysis, industry reports suggest that expense ratios vary by over 1 percentage point between the 10th and 90th percentiles across funds with the same general investment strategy (e.g., among U.S. large cap funds or U.S. small cap funds; ICI, 2023).

To determine the distribution of costs for mutual funds as of the time of this research, we analyze data sourced from Morningstar Direct (www.morningstar.com) in November 2023, with observations at the share class level. The analysis focuses on no-load, non-institutional S&P 500 index mutual funds ($n = 42$).³ Consistent with the literature stated above (Hortaçsu & Syverson, 2004; Cooper, et al., 2021; Scholl, et al., 2023), there is considerable price dispersion for these funds. Figure 1 shows that expense ratios on S&P 500 index mutual funds range from 0% to 1.61%. Additionally, the distribution is highly skewed, with more funds with relatively low costs and fewer with relatively high costs.

Figure 1. Expense Ratio Distributions for No-Load, Non-Institutional S&P 500 Index Mutual Funds.



Note. This figure shows the distribution of expense ratios for no-load, non-institutional share classes of S&P 500 index mutual funds, with each share class included separately. The black lines show values of .08, .32, .48, and .49 — the values used in Study 1.

Higher Fees can Lead to Lower Net Returns

Price dispersion is important because it suggests that consumers who search the mutual fund market may find lower cost alternatives. Although, in theory, higher costs could be offset

³ In Appendix B, we show results for actively managed, US equity large cap blend funds, which pertain to supplementary analyses in Study 1.

by non-financial factors (e.g., customer service), there is little empirical evidence to justify higher fees from a financial perspective. Starting most narrowly, researchers examining S&P 500 index funds argue these funds are essentially commodities, with fees being the only materially varying factor between the funds (see, for instance, Carlson, et al., 2004; Choi, et al., 2010; Elton, et al., 2004; Scholl, 2022). These fees can substantially affect net returns. As an example, imagine an investor who receives an average 10% gross annual return on a \$10,000 investment for 10 years. They would have an ending balance that was more than \$5,000 higher if they found a fund with the 0.02% expense ratio versus one with a 2.31% expense ratio, due to differences in fees and foregone earnings (specifically, \$25,885.60 vs. \$20,531.84).

Researchers also argue that higher fee funds do not necessarily lead to higher net returns when examining broader samples of funds. In an examination of non-index equity mutual funds from 1984 to 2006, Fama and French (2010) argue that abnormal returns (i.e., returns above what one would receive from a passive benchmark) are negative for most if not all actively managed funds, due to the expenses charged. More recently, Cooper, et al. (2021) document a negative relationship between fees and net performance across a sample of equity mutual funds from 1980 to 2017. They estimate “value added” for investors and argue that funds above the 40th percentile of cost consistently have negative value added for investors, with an aggregate loss of \$42 billion over the sample period. Furthermore, Gil-Bazo and Ruiz-Verdu (2009) find that some funds with lower before-fee performance charge higher fees, as their investors are not sensitive to performance differences; this pattern further exacerbates the negative value added found by Cooper and colleagues.

In light of persistent variation in mutual fund fees, and the negative relationship between fund costs and net returns that has been established in some empirical research, it is worthwhile to explore whether communicating relative costs can encourage investors to search for lower cost funds.

Theory and Research on Cost Comparisons for Improving Fund Choice

In Appendix A, we present a theoretical, mathematical model to illustrate how information about the distribution of costs could influence search behavior. In this model, there is a tradeoff between the costs of search, which could include time or financial costs, and the benefits of search, which depend on the chance of finding a less expensive fund and the expected decrease in fees when a less expensive fund is found. The model shows that when investors are more aware of the distribution of fees, they will be willing to pay more to search when offered a high fee fund, and that information about the distribution of fees can improve the investors’ welfare.

In addition to these theoretical benefits of fee information, empirical research on mutual fund decision-making supports the notion that consumers benefit from receiving relative cost information. In Scholl, et al. (2023), the authors ask participants to allocate a hypothetical \$10,000 across sets of S&P 500 index funds, where some participants see text-based information

on fees and others additionally see a fee meter. Providing a fee meter increases allocations to less-expensive funds, leading to a drop of 24-33% in excess fees paid across studies, which the authors argue is welfare improving.

Importantly, in this past research, participants were choosing from a menu of S&P 500 index funds with multiple options. In other words, these studies were conducted in a “joint evaluation” mode, where participants saw multiple product options simultaneously, and could compare them (Hsee & Zhang, 2010). It remains unknown whether fee distribution information benefits consumers in a “single evaluation” mode, where they see only one investment option at a time. The current research addresses that limitation.

The Design Details of Comparative Information Displays

Designing a fee meter leads to decisions about how the underlying distribution is displayed, how firms are supposed to display their product within that distribution, and other factors. Unfortunately, the literature does not appear to provide generalized design recommendations, leaving questions about which factors information designers should require when providing comparative information to consumers. The current paper examines three design variants, which provide increasing amounts of information to consumers in the form of discrete threshold markers and associated labels.

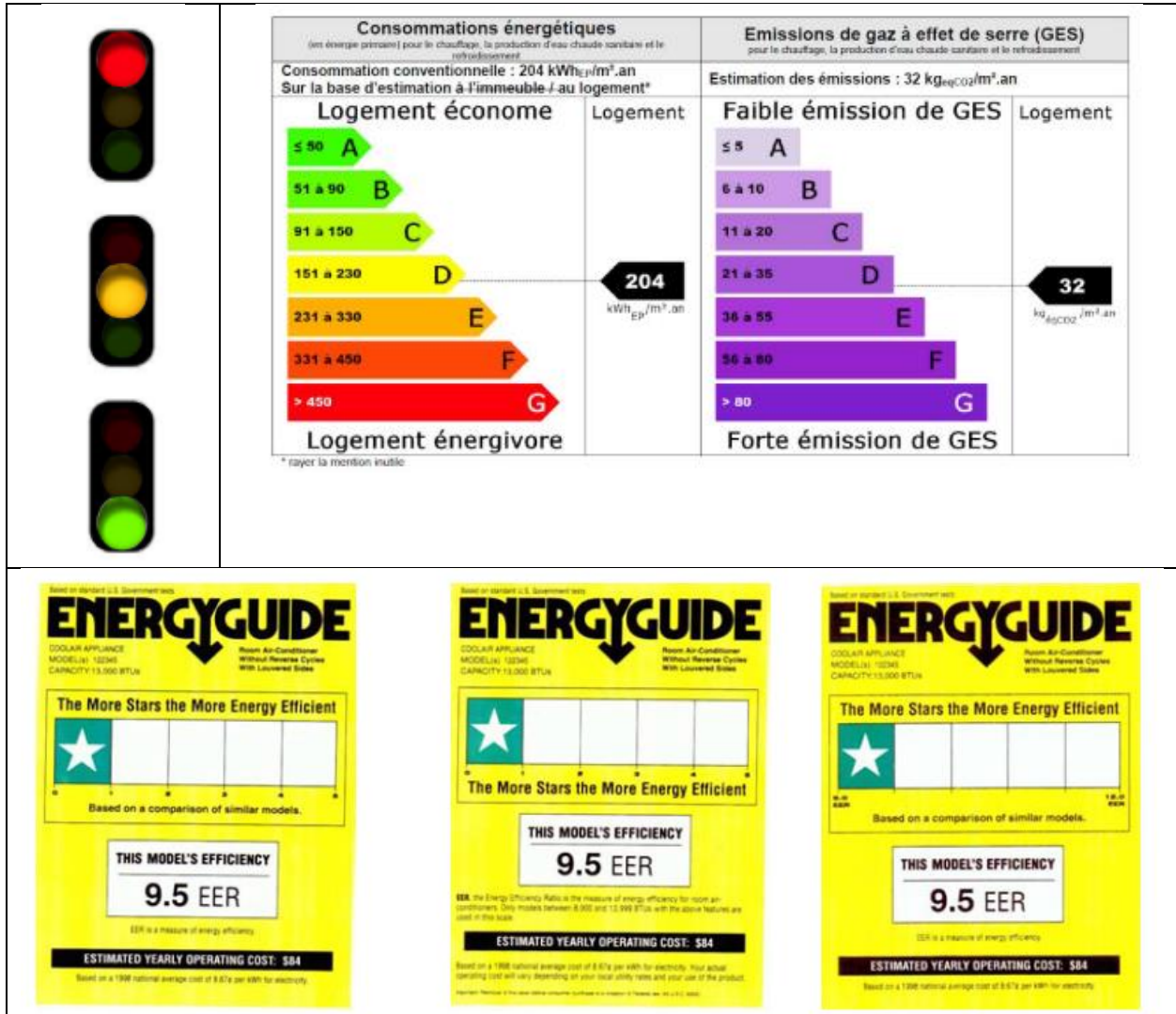
Continuous vs. Discrete Categories and Labels

A few existing papers examine the effects of discrete category labels on consumer decisions. In VanEpps et al. (2021), the authors examine the influence of real-time dynamic caloric labels on meal choices. Experimental conditions included feedback in the form of aggregated meal calories (as an integer), color-coded traffic lights (green, yellow, or red), and both. The results showed a significant reduction in calories ordered among participants exposed to aggregated feedback—both continuous, aggregated numbers and discrete traffic lights—compared to those provided with numeric labels on individual meal items.

Similarly, there are at least two papers studying the effects of discrete category ratings on consumer behavior in the energy domain. Lu and Spaenjers (2024) examine the effects of A through G letter grades that are presented in certificates that also show energy consumption or greenhouse gas emissions as integer values. Using regression analysis, they suggest that prices of single-family homes drop discontinuously between 1.9% and 4.5% around most of the thresholds (e.g., when moving from a C- to D-rated home). In a second example, Sejas-Portillo, et al. (2024) examine energy efficiency information in the UK, which takes the form of a 1-100 rating scale that is mapped into an A through G rating. These authors find that there are price discontinuities around the rating thresholds, with property sellers becoming more likely to invest in energy improvements when they are just below a threshold, and properties selling for thousands of pounds more when they are just above a threshold. Both papers suggest that category thresholds can have a disproportionate effect on how people interpret discrete rating information.

The question of whether labels on category thresholds are helpful for consumer communications appears to have received less direct attention in the academic literature. In one example, Thorne and Egan (2002) qualitatively tested alternative designs for appliance energy labels, including those that varied in the amount of labeling (Figure 2). They do not reach strong conclusions about the efficacy of threshold labels, leaving this issue as an open question for future research.

Figure 2. Examples of Comparison Information from Other Domains.



Note. In the top row, the left panel shows example discrete labels (in the form of traffic lights) from Van Epps et al. (2021) whereas the right panel shows the graphic displayed in Figure 1 of Lu and Spaenjers (2024). The bottom row contains variations on EnergyGuide labels examined in Thorne and Egan (2002), reproduced from their Figure 8.

The Current Research

Building off of economic and psychological theory, as well as existing empirical research, we examine the following research questions:

1. In the absence of relative cost information, how accurate are U.S. consumers' estimates of the relative cost of S&P 500 index funds? (Study 1)
2. Do mutual fund fee meters improve consumers' estimates of the relative cost of mutual funds? (Study 2)
3. Are relative costs a mechanism for the effect of fees on willingness to pay (WTP) to search for an alternative fund? In other words, are differences in WTP across funds with different fees driven by investors' beliefs that these funds are *relatively* high or low cost? (Study 2)
4. Further, do fee meters moderate the relationship between fees and WTP to search for an alternative fund? Specifically, is there a stronger relationship between fees and WTP to search among consumers viewing fee meters (vs. those not viewing fee meters)? (Study 2)

Two additional research questions are examined in Appendix C:

5. Does the fee-WTP relationship vary by specific design elements of fee meters: discrete categories and labels? (Study 2)
6. Are the effects of fee meters on WTP moderated by investor status or numeracy? (Study 2)

2. Study 1: Knowledge of Relative Costs is Lacking

This study was designed to answer our first research question: In the absence of relative cost information, how accurate are U.S. consumers' estimates of the relative cost of S&P 500 index funds? An intervention that provides relative cost information may have little impact on evaluations, knowledge, and behavior, if consumers are already aware of that information.

Method

Sample

The study was approved by the Institutional Review Board (IRB) at NORC. We recruited participants using the AmeriSpeak omnibus survey, a nationally representative survey of US adults conducted over the phone and online.⁴ We had 1,017 respondents, with an average age of 50 years ($SD = 19$); 48% of respondents were men; 9% responded by telephone and 91% responded online. For some analysis we considered differences by investors and non-investors,

⁴ For more information about the AmeriSpeak omnibus surveys, see <https://amerispeak.norc.org/us/en/amerispeak/our-capabilities/amerispeak-omnibus.html>.

but we only have that information for 572 participants; of those, 83% report that they hold financial investments.

Design and Relative Cost Estimates

This study was a 4-cell between-subjects design in which participants estimated the relative costs of S&P 500 index funds. The four cells captured four different expense ratios, 0.08%, 0.32%, 0.48% and 0.49%, which we estimated represented the 15th, 55th, 75th, and 77th percentiles of fees. These percentiles were chosen to represent a range in fees across the distribution, with an emphasis on relatively higher-cost funds. In addition, all participants were asked about fees on actively managed, US large cap blended mutual funds; as we do not analyze the effectiveness of fee meters for actively managed funds in Study 2, we do not concentrate on results for this sector here.⁵

To measure relative costs, we use cost percentile estimates. Participants were asked to answer the following question to measure their cost percentile estimates:

We are going to ask you about fees charged on “no load” mutual funds that track the S&P 500 index. The S&P 500 index measures the performance of about 500 U.S. companies.

Suppose there are 100 such mutual funds, sorted in order by fees (annual operating expenses). These 100 funds mirror exactly what you can find in the market. If one of the mutual funds has annual operating expenses of [0.08% / 0.32% / 0.48% / 0.49%], how many funds would be cheaper than that fund?

Participants answered by providing a value between zero and 100, inclusive. We calculated the accuracy of each estimate by subtracting the true cost percentile of fees from the estimate provided by each respondent.⁶ Half of the participants were asked about an S&P 500 fund first and then an actively managed fund, and half of the participants were asked about an actively managed fund first and then an S&P 500 fund.

⁵ The inclusion of active funds means that the full study used a 4x2 mixed design; the first factor captured different costs and the second factor counterbalanced the order between the two types of funds (“no load,” S&P 500 index funds and actively managed funds). Participants estimated that the displayed fees for actively managed funds were at the 42nd percentile, on average, which was not significantly different from the mean estimated percentile for S&P 500 funds.

⁶ The cost percentile estimates provided by respondents measure the exclusive percentile, or the percent of funds with fees lower than the given value, whereas the true percentiles are based on the inclusive percentile, or the percent of funds with fees lower than *or equal to* the given value. Because the cost percentile estimates are based on 100 funds, this creates a one-percentile discrepancy between the exclusive and inclusive percentile for participants’ cost percentile estimates, which does not change the substantive results.

Results

In the Absence of Relative Cost Information, U.S. Consumers Do Not Accurately Estimate the Relative Cost of S&P 500 Index Funds (RQ 1).

Table 1 shows that average reported cost percentile was between 37 and 42 across all of the expense ratios shown. In other words, no matter what expense ratio they had seen, all respondents reported that approximately 40 percent of funds had lower fees. This means that participants in none of the conditions were accurate, on average, and that estimates of the relative cost percentiles were not sensitive to the expense ratios presented. Estimates of the percentile for the 0.08% annual fee were too high (i.e., the fund was perceived as more expensive than it actually was) and estimates of the percentile for expense ratios of .32% and higher were too low (the funds were perceived as less expensive than they actually were).

Table 1. Cost Percentile Estimates and True Cost Percentiles for S&P 500 Index Funds (Study 1)

	A	B	C	D	Average⁷
Expense ratio	0.08	0.32	0.48	0.49	0.35
True cost percentile	15	55	75	77	57
Participants who saw S&P 500 first (N = 514)					
Cost percentile estimate	37	41	38	41	40
SD of cost percentile estimate	(37)	(32)	(27)	(31)	(32)
Error (Estimate - True percentile)	22	-14	-37	-36	-17
Non-response	25%	28%	27%	26%	26%
Cost percentile estimate = 50	12%	12%	9%	16%	12%
All participants (N = 1017)					
Cost percentile estimate	42	42	38	42	41
SD of cost percentile estimate	(40)	(33)	(27)	(32)	(33)
Error (Estimate - True percentile)	27	-13	-37	-35	-15
Non-response	23%	28%	24%	22%	24%
Cost percentile estimate = 50	9%	8%	8%	12%	9%

Note. SD = Standard deviation.

We analyzed average cost percentiles both for those who saw the S&P 500 fund first and after combining those who saw the S&P 500 fund first and those who saw the actively managed fund first. Neither group shows a statistically significant difference in the reported cost

⁷ Averages presented here represent the average across all respondents, including the average true percentile, which averages across the four percentiles displayed to respondents, not the percentile of the average expense ratio.

percentile estimates across the four shown expense ratios ($F = 0.43$, $p = 0.73$ for respondents who saw the S&P 500 first, and $F = 0.66$, $p = 0.58$ for all respondents).

Exploratory Analysis

An alternative way of exploring knowledge of cost information is to examine non-responses (either skipping or explicitly saying “I don’t know” in a phone interview), as well as rounded responses. Literature on expectations (typically answered on scales from 0%-100%) shows that people often use focal responses such as 0%, 50%, and 100% when they are unsure how to answer expectations questions (Bruine de Bruin & Carman, 2012; Bruine de Bruin, et al., 2023). The cost percentile estimates elicited in this study were also reported on a 0-100 scale and were akin to the probability that the assigned expense ratio was more expensive than another fund. We show that about one quarter of participants do not respond to these questions and about one in 10 report 50%, but these proportions do not vary across condition (Table 1). We also considered differences in cost percentile estimates by participants’ investor status, mutual fund ownership, and subjective knowledge of mutual fund fees.⁸ We found no differences across conditions by these characteristics. Finally, we conducted the same analysis for responses about actively managed funds, and again found no differences across conditions. These results are included in Appendix B.

Discussion

Overall, we interpret the consistency in reported cost percentile estimates, despite significant underlying differences in fees, to suggest that participants are not aware of relative costs in the mutual fund industry. As such, an informational display containing this information may be helpful for investors. We turn to this point in Study 2 by randomly assigning some participants to a fee meter and measuring knowledge, evaluations, and WTP to search.

3. Study 2: Effects of Fee Meters on Investor Knowledge and Decisions

Study 2 was designed to explore our remaining research questions regarding the potential effects of a fee meter on WTP, the mechanism for such an effect, and potential heterogeneity in impacts. To examine these questions, all participants were asked to consider a hypothetical S&P 500 index fund and to report their WTP to search, which represents the value they assign to seeing an alternative option. We focus on S&P 500 index funds so that we can isolate the effects of providing cost information. We measured beliefs about relative cost as our primary

⁸ Subjective fee knowledge was assessed with the following question “How much do you agree or disagree with the following statements about your knowledge of mutual funds: I understand the fees normally paid for mutual funds.”, with responses “Strongly disagree,” “Disagree,” “Neither agree nor disagree,” “Agree,” and “Strongly agree.”

mechanism for changes in WTP to search. Different design variants of the fee meters were tested to examine the effect of visual features and potential moderation.

Method

Sample

The study was approved by the IRB at NORC and pre-registered (https://aspredicted.org/D3S_NHS). We recruited 7,087 participants using a subset of NORC's AmeriSpeak panel, a nationally representative panel of US adults.⁹ The survey was conducted online and the median response time for participants who completed the survey was 12 minutes. Overall, the sample had an average age of 50.2 ($SD = 16.4$), and was 46.3% male, 85.5% investors, 55.8% White non-Hispanic, 16.6% Black non-Hispanic, 8.3% Asian-Pacific Islander non-Hispanic, 3.1% another option and non-Hispanic, and 16.2% Hispanic. For completing this survey, participants were offered the cash equivalent of \$2 from May 17, 2024 through May 27, 2024. On May 28, 2024, the incentive for completion was raised to the cash equivalent of \$3 to encourage more participation. This higher rate was paid to respondents until the survey closed on June 3, 2024. As described below, certain participants were also provided with an additional bonus payment based on the investment choices made in the experiment.

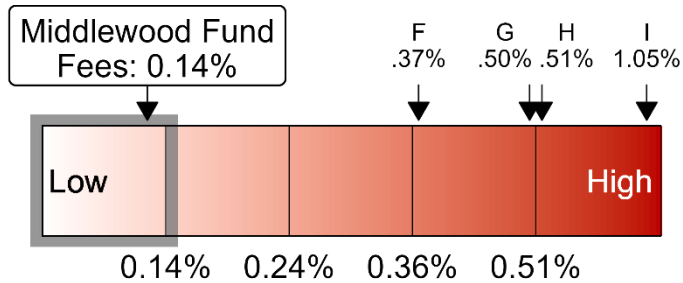
Experimental Design

This study was a 4x5 between-subjects experiment. The first factor captured the fee display conditions: a text only condition (no meter), a continuous meter, a discrete meter with five categories, or a discrete meter that additionally contained labels.

The second factor captured variation in expense ratios, which we referred to as “fees” throughout the experiment for simplicity. We deliberately selected five fee levels, bearing in mind two primary considerations. First, from a policy perspective, we believed that the potential welfare benefits of a fee meter are greater for investors holding high-fee funds, as these investors have higher potential gains from finding less-expensive alternatives than those holding relatively low-cost funds. As such, we assigned the majority of the sample to relatively high fees. Second, in order to power analyses between continuous and discrete meters, we concentrated on expense ratios near discrete meter category thresholds (that is, close to 20%, 40%, 60% or 80% for a meter with quintiles). Doing so allowed us to compare two funds that were similar in terms of underlying cost while appearing in different quintiles on the discrete or labeled meters. Ultimately, the constraints imposed by these considerations led us to choose percentiles 17, 61, 79, 81, and 98, with corresponding expense ratios of 0.14%, 0.37%, 0.50%, 0.51%, and 1.05% (see Figure 3).

⁹ All respondents are recruited from the AmeriSpeak® panel, a probability-based panel funded and operated by NORC at the University of Chicago. All respondents participated in a survey conducted in October 2023 about household finances. The majority are panel members in THRIVE, a nationally representative survey research panel designed by the Office of Investor Research in the Office of the Investor Advocate at the SEC. The THRIVE panel includes oversamples based on race and ethnicity and includes both investors and non-investors. THRIVE panel members receive one to two surveys per quarter about their investing behavior and attitudes.

Figure 3. Example Labeled Discrete Meter Showing Location of 17th (A), 61st (F), 79th (G), 81st (H), and 98th (I) Percentiles of Fees.



Note. This figure shows an example discrete, labeled meter. In the experiment, one of the five percentiles would have been labeled using a box on the top of the bar (with variation by experimental condition). We show all five fee levels here to illustrate the percentiles chosen.

Procedure and Measures

Upon entering the experiment, participants were asked to review information about a hypothetical S&P 500 index fund called the Middlewood 500 Index Fund. We then provided background information on factors that many investors consider when making real world investment decisions: the objective of the fund, fees, risks, and historical performance. Although the information provided was necessarily brief in order to accommodate an experimental environment, we sought to preserve real-world accuracy. In particular, performance graphs were constructed by fee condition to reflect the net performance of the fund over 10 years, which is consistent with requirements in open-end fund prospectuses and shareholder reports.¹⁰ As the Middlewood 500 Index Fund was a hypothetical S&P 500 index fund, we plotted the performance of the S&P 500 index net of fees. Additionally, the information was presented in the order required by mutual fund prospectuses.¹¹

Relative Cost Estimates

Participants were asked to report their beliefs about the distribution of mutual fund fees for S&P 500 index funds. To elicit beliefs, we asked each participant to report four cost percentile estimates. Each of the four questions read:

Suppose there are 100 S&P 500 index funds, ordered from lowest fee to highest fee. These 100 funds mirror exactly what you can find in the market. If one of the mutual

¹⁰ Both open-end fund prospectus and shareholder report disclosure requirements require net performance to be shown for the past 10 years (as well as for additional, shorter periods) in tabular format, and annual shareholder reports require a line graph showing net performance over a 10-year period; see Form N-1A, Item 4(b)(2) (requirements for risk/return bar chart and table in open-end fund prospectuses) and Item 27A(d)(2) (requirements for line graph and table in open-end fund annual shareholder reports). We used a performance line graph in this study to emphasize a 10-year performance period, which was relevant for variable incentives that participants could earn (see additional information in the “Willingness to pay to search for an alternative fund” subsection below).

¹¹ See order of items required by Form N-1A at: <https://www.sec.gov/files/form-n-1a.pdf>

funds has fees of [0.14% / 0.37% / 0.51% / 1.05%], how many funds would be cheaper than that fund?

Responses were entered in an open-text box. These questions are similar to those in Study 1, however, in contrast to Study 1, each participant was asked to assess four different fee levels that aligned with the following true percentiles: 16th, 60th, 78th, 80th, and 97th. The order of the fees was counterbalanced to an ascending or descending order across participants. Because these questions were difficult, participants who did not answer monotonically were given a second chance to provide estimates. To assess research question 2, we calculate the accuracy of these estimates, comparing the cost percentile estimate to true percentile.¹² Finally, we asked for the minimum and maximum fees available in the market via multiple choice questions.

Willingness to Pay to Search for an Alternative Fund

We next elicited WTP to search for an alternative mutual fund. To set up this series of questions, we asked participants to imagine that they had \$10,000 to invest for 10 years and would choose one mutual fund for their investment. They were further instructed that participants could receive bonus payments based on the performance of their chosen investment. All participants were instructed that they had an opportunity to see an alternative to the Middlewood 500 Index Fund for their investment, but to do so they would have to pay an access fee out of their \$10,000. As such, a higher stated WTP would increase the chances they could see the alternative fund, but would also reduce their initial investment amount.

Participants answered a series of four questions of the following form, “Would you be willing to pay \$[value] of your hypothetical \$10,000 to search for a different fund?”¹³ The WTP value listed in the questions was updated in an unfolding bracket structure, starting at \$100. Based on responses we can place participants into WTP buckets of <\$1, [\$1-\$15), [\$15-\$35), [\$35-\$50), [\$50-\$60), [\$60-\$75), [\$75-\$85), [\$85-\$100), [\$100-\$125), [\$125-\$150), [\$150-\$175), [\$175-\$200), [\$200-\$300), [\$300-\$500), [\$500-\$750), and \$750+. For each question, the fee information was displayed below the question text according to the participant’s condition (see Appendix C for screenshot).

In the background, we randomly drew one WTP threshold (\$115) that we compared to each participant’s stated WTP to determine whether they searched. We also drew a randomly selected fund’s expenses from the Morningstar data (with an expense ratio of 0.54%). Those

¹² As in Study 1, the cost percentile estimates provided by respondents measure the exclusive percentile, the percent of funds with fees lower than the given value, while the true percentiles are based on the inclusive percentile, the percent of funds with fees lower than or equal to the given value. Because the cost percentile estimates are based on 100 funds, this creates a one-percentile discrepancy between the exclusive and inclusive percentile for participants’ cost percentile estimates, which does not change the substantive results.

¹³ Beliefs about future returns could also affect WTP to search, but their effect is small relative to differences in fees. For example, based on the empirical distribution of fees in Figure 1, and assuming a 10% return, the expected benefits of search are approximately \$220 for a fund with a .5% expense ratio and \$22 for a fund with a .14% expense ratio. These values change to approximately \$208 and \$21, respectively, when assuming a 5% return. To calculate bonus payments in the experiment, we used an average annual return of 10%.

participants who signaled a WTP in the [\$100-\$124) bucket or higher could choose between the randomly assigned fund that they had originally seen and the new fund; of those who made a selection, 85.2% chose the lower cost fund (7 participants did not respond).

Evaluations

Participants were asked to evaluate the fund in response to the following statements, all measured from 1 = Strongly disagree to 5 = Strongly agree:

- I am interested in investing in this fund
- This fund seems like a good choice compared with funds that have a similar strategy
- This fund seems expensive (reverse-coded)
- I think this fund will perform well over the next 10 years

We took the average of these statements to calculate overall evaluations of the Middlewood 500 Index Fund. The Cronbach's alpha was .71.

Perceived Helpfulness and Clarity of Fee and Expense Information

Participants were asked to indicate how helpful they perceived the fee and expense information to be. For each question, we showed them the fee information corresponding to their fee display condition. Specifically, we asked:

- How helpful was that information in assessing the fund's fees? with the response options: Very helpful = 4, Somewhat helpful = 3, A little bit helpful = 2, and Not at all helpful = 1
- How easy or hard was that information to understand? with the response options Very easy to understand = 5 to Very hard to understand = 1
- How well did you understand the information conveyed about the fund's fees? with response options I understood completely = 5, I mostly understood = 4, I understood somewhat = 3, I understood very little = 2, I didn't understand at all = 1.

Although these questions were not a central focus of our research, we believe that they could provide qualitative perceptions that could be helpful when considering fee displays.

Subjective Measure of Relative Cost

As an exploratory measure, we asked an alternative version of relative cost estimates after participants completed questions about the perceived helpfulness of the fee information. We asked, "Please select the statement which best reflects your beliefs. Compared to similar funds, the fees for the Middlewood 500 Index Fund are:" with response options "Much below average for this type of fund" = 1, "Below average for this type of fund" = 2, "About average for this type of fund" = 3, "Above average for this type of fund" = 4, and "Much above average for this type of fund" = 5.

Value of Search from Fitted Beliefs

In certain analyses below, we calculate the implied value of search using respondents' cost percentile estimates for all four elicited fee levels, as well as their reported beliefs about the minimum and maximum fees on funds. Specifically, we first create a fitted distribution of beliefs (following Engelberg, et al., 2009) by fitting parameters of a generalized beta distribution to best match these six quantitative estimates. After creating these distributions, we calculate the expected gains from searching as:

$$\int_{x_0}^{x^*} R(x) - R(x^*) d\hat{F}(x),$$

where x_0 is the minimum fee, x^* is the fund's fee, $R(x)$ is the returns for a fund with fees x , and \hat{F} is the fitted distribution for beliefs.

Demographics and Background Characteristics

We drew demographic information and other background characteristics from the survey panel that we used to recruit participants. Basic demographic variables used in weighting (e.g., age, gender, race, and ethnicity) are refreshed annually by the panel provider, NORC. We merged in data from past surveys on numeracy (based on Fagerlin et al., 2007) and mutual fund ownership to explore potential differences among participants who varied in financial sophistication.

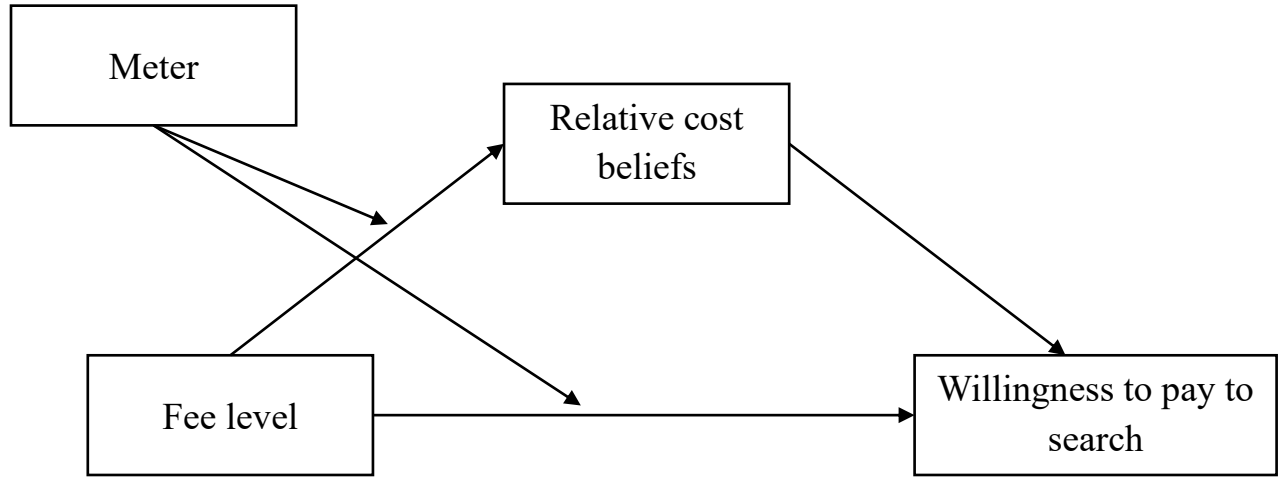
Analytic Strategy

To examine the potential role of fee display in affecting WTP to search for another fund, we use the conceptual model represented graphically in Figure 4. Focusing first on the bottom of the figure, fund fees are posited to be positively correlated with WTP, meaning that those who are assigned a relatively expensive fund should have higher WTP to search for an alternative. As discussed in the theoretical framework in Appendix A, this relationship is mediated by beliefs about relative cost, meaning that the fee level affects *beliefs* about relative costs, and it is these beliefs that determine WTP.¹⁴

On the left side of Figure 4, the “fee display” box suggests that fee meters are expected to moderate the relationships between fees and beliefs or fees and WTP. In other words, we expect a stronger relationship between fee level and either relative cost beliefs or WTP when a fee meter is present, versus when it is absent. Our expectation is that when people see a fee meter, relative to only the fee as text, they will have more accurate estimates of relative costs. This increased accuracy in relative costs will translate into more sensitivity between fee level and WTP to search for an alternative fund.

¹⁴ For additional information on mediation and moderation, see Baron and Kenny (1986) and subsequent literature.

Figure 4. Moderated Mediation Analysis for Effects of Fee Level on WTP to Search.



Estimation

The model represented in Figure 4 requires the estimation of two equations.¹⁵ The first equation uses variables representing the fee levels, fee display, and their interactions to predict relative cost beliefs (the mediator). The second equation uses the fee levels, fee display, their interactions, and relative cost beliefs to predict the outcome (WTP to search). The first equation is estimated with ordinary least squares regression and is shown below:

$$CostPercentileEstimate_i = \alpha_0 + \alpha_{FeeLevel}FeeLevel_i + \alpha_{Meter}Meter_i + \alpha_{FeeLevel \times Meter}(FeeLevel_i \times Meter_i) + \varepsilon_i \quad (1)$$

where $CostPercentileEstimate_i$ is the number of funds, out of 100, a participant believes are cheaper than their initial fund, $FeeLevel_i$, is composed of four indicator variables, one for each of the four fee levels greater than the 17th percentile (i.e., Fee A)¹⁶, and $Meter_i$ is an indicator for whether any meter was shown.¹⁷

The second equation is shown below:

$$WillingnessToPay_i = \beta_0 + \beta_{FeeLevel}FeeLevel_i + \beta_{Meter}Meter_i + \beta_{FeeLevel \times Meter}(FeeLevel_i \times Meter_i) + \beta_{CostPercentileEstimate}CostPercentileEstimate_i + \varepsilon_i \quad (2)$$

where $WillingnessToPay_i$ is the WTP interval participants have for searching for an alternative fund. We use a double-bounded estimator (Lopez-Feldman, 2012) to estimate the equation, as it

¹⁵ Note that below, we run supplementary analyses where the mediator is subjective evaluation of relative costs (as a measure of relative cost beliefs shown in Figure 4). In these analyses, we follow a similar functional form, but replace the variable for $CostPercentileEstimate_i$ with one for subjective evaluation of relative costs.

¹⁶ Our pre-registered analyses have Fee level G as the excluded category, with indicator variables for Fee levels A, F, H, and I.

¹⁷ The pre-registered analysis splits the three meter conditions into separate variables with the discrete meter compared against the continuous meter and the labeled meter compared against the discrete meter.

is more appropriate when the outcome (*WillingnessToPay_i*) is measured with ordinal buckets. To calculate the treatment to mediator to outcome path, often called the “indirect effect,” we multiply the treatment coefficients, the moderator variables, and all their interactions in Equation 2 by $\beta_{CostPercentileEstimate}$. This process is repeated 5,000 times using bootstrap sampling, allowing the calculation of 95% bootstrapped confidence intervals for the estimated pathways.

To test research question 3, regarding the mechanism for the effect of fees on WTP, we estimate the average difference in WTP for fee level variables (each relative to Fee A) through changes in the relative cost beliefs. Statistical significance is determined by whether the 95% bootstrapped confidence intervals for these coefficients, that is, $\alpha_{FeeLevel} \times \beta_{CostPercentileEstimate}$, contain zero. We expect that the indicator variables in $\alpha_{FeeLevel}$ and $\beta_{CostPercentileEstimate}$ will be positive, because higher fees are expected to increase relative cost beliefs, and relative cost beliefs are expected to increase WTP to search.

To test research question 4, whether fee display moderates this mechanism, we estimate the indirect effects of the interactions between fee level variables and fee display variables. The simplest test is whether the 95% bootstrapped confidence intervals for the Fee level by Meter coefficients do not contain 0. If fee meters increase participants’ knowledge of relative costs compared to text only, these coefficients should be positive, indicating the sensitivity to fee level on WTP is greater when a meter is present.

Estimated differences between meters, or research question 5, and potential heterogeneity by subgroup, or research question 6, can both be found in Appendix C.

To claim that relative cost beliefs cause changes in WTP, there are two assumptions that should be highlighted: (1) relative cost beliefs have a constant relationship with WTP across the conditions and (2) sequential ignorability (Imai et al. 2010). Assumption (1) means that, on average, a one percentile increase in cost percentile estimates has the same relationship with WTP at every fee level and fee display combination. There are two components to Assumption (2). First, conditional on treatment assignment, there are no confounding variables impacting the mediator. Given the treatment randomization, this is a reasonable assumption. Second, conditional on treatment status there are no confounding variables between the mediator and the outcome. This is a stronger assumption given that we did not randomize participants to different levels of the mediator.

Exclusions

We pre-registered three exclusion criteria. First, we exclude anyone who does not provide an estimate for all the relative cost estimate questions, which excludes 1,233 participants. Adding the restriction that all estimates had to be integer values between 0 and 100, inclusive, excludes an additional 151 participants. We apply these restrictions so that we can estimate the value of search from fitted beliefs for all participants. Next, participants must also answer the first WTP question for an alternative fund, eliminating an additional 129 participants. Finally, participants must provide monotonic responses for their cost percentile estimates,

eliminating an additional 1,150 participants. We require monotonic percentile estimates to calculate our measure of expected gains from search. These exclusions result in a final sample size of 4,424.

Results

Fee Meters Improve the Accuracy of Relative Cost Estimates (RQ2)

Participants who saw a fee meter were more accurate, on average, about the cost percentile of their assigned version of the Middlewood 500 Index Fund than those in the text-only condition (Table 2). In particular, for fee levels F, G, H, and I, the average error of cost percentile estimates for participants in any of the meter conditions was lower than the average error for participants in the text condition (all $ps < 0.001$). As shown, participants viewing these fees tended to underestimate the cost percentile of the assigned fund, on average. Error in the meter conditions was reduced to between 48.3% and 58.2% of the error in the text fee display across the fee levels.

The average error in cost percentiles for participants who got the lowest fee, fee A, was not significantly different from zero in the text condition ($b = 0.91, t(4414) = 0.53, p = .60$). While, the average error in cost percentiles for those who got the lowest fee and a meter was significantly different from zero ($b = -2.54, t(4414) = -2.60, p = .009$), the difference in average error between text and any meter for those with an A fee level is not significantly different ($b = -3.46, t(4414) = -1.73, p = .08$). In other words, participants estimated cost percentiles similarly for the lowest fee level, on average, regardless of fee display, but at the higher fee levels, the fee meters helped participants estimate relative costs more accurately.

Table 2. Cost Percentile Estimates and Accuracy by Experimental Condition.

Fee level and expense ratio	A	F	G	H	I	Average
True cost percentile	16	60	78	80	97	
Text-only condition						
Cost percentile estimate	17.9	29.8	39.5	41.0	54.7	36.3
SD of cost percentile estimate	(21.0)	(23.1)	(24.9)	(25.0)	(31.5)	(28.1)
Error (Estimate - True percentile)	0.9	-31.2	-39.5	-40.0	-43.3	-30.2
Cost percentile estimate = 50	7.7	13.2	26.7	30.7	17.8	18.9
Any Meter						
Cost percentile estimate	14.5	44.6	56.0	61.7	73.3	49.8
SD of cost percentile estimate	(18.1)	(24.4)	(27.1)	(27.1)	(31.9)	(33.1)
Error (Estimate - True percentile)	-2.5	-16.4	-23.0	-19.3	-24.7	-17.1
Cost percentile estimate = 50	4.7	10.0	18.7	16.6	11.2	12.1

Note. SD = Standard deviation.

Next, we examine whether accuracy of cost percentile estimates differs across the three different fee meter displays. Recall that the displays provided design elements, which could have differentially helped participants estimate relative costs. Using the continuous meter as the comparison group, we find only one difference in accuracy across the five fee levels (Table 3). Specifically, the error in cost percentile estimates for the highest fee level, fee I, is significantly lower for the labeled meter compared to the continuous meter ($b = 10.17$, $t(4404) = 2.98$, $p = .003$); error in the labeled fee meter is 69.5% of the error in in the continuous meter fee display. Given the number of non-significant comparisons examined in this analysis (i.e., including the other fee levels and other fee displays), these results suggest that the different meter variants were not meaningfully different from one another in affecting accuracy of cost percentile estimates.

Table 3. Cost Percentile Estimates and Accuracy across Meter Variants.

Fee Level and Expense Ratio	A	F	G	H	I	Average
True cost percentile	16	60	78	80	97	
Continuous Fee Meter						
Cost percentile estimate	14.9	44.0	58.3	60.4	68.9	49.3
SD of cost percentile estimate	(18.8)	(24.6)	(26.0)	(25.6)	(33.6)	(32.4)
Error (Estimate - True percentile)	-2.1	-17.0	-20.7	-20.6	-29.1	-17.9
Cost percentile estimate = 50	6.3	9.0	17.0	18.2	15.4	13.2
Discrete Fee Meter						
Cost percentile estimate	15.0	43.6	53.0	64.2	73.1	49.8
SD of cost percentile estimate	(19.5)	(25.2)	(27.8)	(27.0)	(31.6)	(33.5)
Error (Estimate - True percentile)	-2.0	-17.4	-26.0	-16.8	-24.9	-17.3
Cost percentile estimate = 50	4.3	6.0	17.0	12.4	10.6	10.0
Labeled Discrete Fee Meter						
Cost percentile estimate	13.6	45.9	56.7	60.4	77.8	50.3
SD of cost percentile estimate	(16.1)	(23.6)	(27.3)	(28.6)	(29.9)	(33.3)
Error (Estimate - True percentile)	-3.4	-15.1	-22.3	-20.6	-20.2	-16.1
Cost percentile estimate = 50	3.7	14.2	22.1	19.1	7.5	13.2

Note. SD = Standard deviation.

Table 4 shows the differences in cost percentile estimates using a regression analysis. Given the generally non-significant results among the fee displays in Table 3, we examine all fee meter conditions together, relative to text-only conditions. As before, the table shows that participants who see a fund with higher fees perceive the fund as relatively more expensive, even

in the conditions that did not view a fee meter. Perceptions of the relatively high-cost funds (Fee levels F through I) increase even further for participants viewing a meter, with estimated increases of approximately 20 percentile points.

Table 4. Regression Results Estimating Effects of Experimental Conditions on Cost Percentile Estimates.

	Cost percentile estimate
Fee F	11.84*** (2.47)
Fee G	21.59*** (2.49)
Fee H	23.10*** (2.53)
Fee I	36.77*** (2.48)
Meter	-3.46 (2.00)
Fee F * Meter	18.30*** (2.84)
Fee G * Meter	19.98*** (2.87)
Fee H * Meter	24.13*** (2.89)
Fee I * Meter	22.03*** (2.85)
Constant	17.91*** (1.74)
Observations	4,424
R-squared	0.365

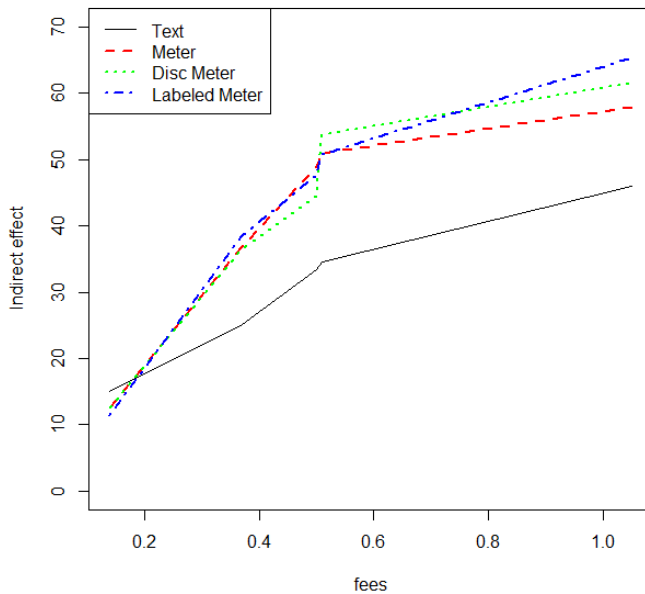
Note. *, **, and *** denote statistical significance at the .05, .01, and .001 levels, respectively. Standard errors in parentheses.

Relative Costs Affect WTP to Search for an Alternative Fund (RQ3)

Equation 2 yields an estimate of $B_{CostPercentileEstimate} = 0.841$ ($se = .173$) for the coefficient of cost percentile estimates on WTP. In other words, for a one-percentile increase in cost percentile estimates, WTP to search increases by 84 cents. It is difficult to assess the magnitude of this coefficient directly; rather, we use this estimate as part of our analytic strategy. Specifically, we use this estimate to measure the indirect effect of relative cost beliefs on WTP. Figure 5 presents the result of multiplying the estimates of Equation 1, which estimate the effect

of the experimental condition on cost percentile estimates, by the coefficient .841, the estimated effect of cost percentile estimates on WTP to search. The product of these two is our estimate of the impact of fee meters that occurs through a change in relative cost beliefs. We plot these indirect effects as a function of the fee level in Figure 5. It shows for instance, that – *because of* changes in cost percentile estimates – participants assigned an expense ratio of 0.50% versus those assigned an expense ratio of 0.17% have \$18 higher WTP if they were given text about fees, and \$32 higher WTP if were given a fee meter. As shown, there is little difference between the continuous meter, discrete meter, and labeled meter.

Figure 5. Indirect Effects of Relative Cost Beliefs on WTP to Search for an Alternative Fund.



Note. Estimates are generated by multiplying the estimates of Equation 1, which estimate the effect of the experimental condition on cost percentile estimates, by the estimated effect of cost percentile estimates on WTP to search, using the methodology outlined in the “Estimation” subsection above.

Fee Meters Moderate the Fee-WTP Relationship (RQ4)

We expected that participants viewing a meter, relative to those viewing text only, would provide a lower WTP to search for fee level A (as the fund is one of the best options available in the market), and a higher WTP to search for all higher fee levels. Table 5 shows that those viewing the meter for fee level A are willing to pay \$2.83 less to search (i.e., the coefficient on Meter), relative to those in the text-only condition, due to the change in relative cost beliefs. For all other fee levels except for A, WTP is higher in the meter conditions than the text-only condition. At the highest fee level, participants viewing the meter are willing to pay approximately \$15 (= 18.05 – 2.83) more to search for an alternative fund than participants that did not see the meter, due to differences in beliefs about relative costs. Although the increase in

WTP induced by changes in cost percentile estimates between meter presentations and text is significant at the 5% level, these changes are small relative to the fees that an investor could incur over a 10-year investment horizon.

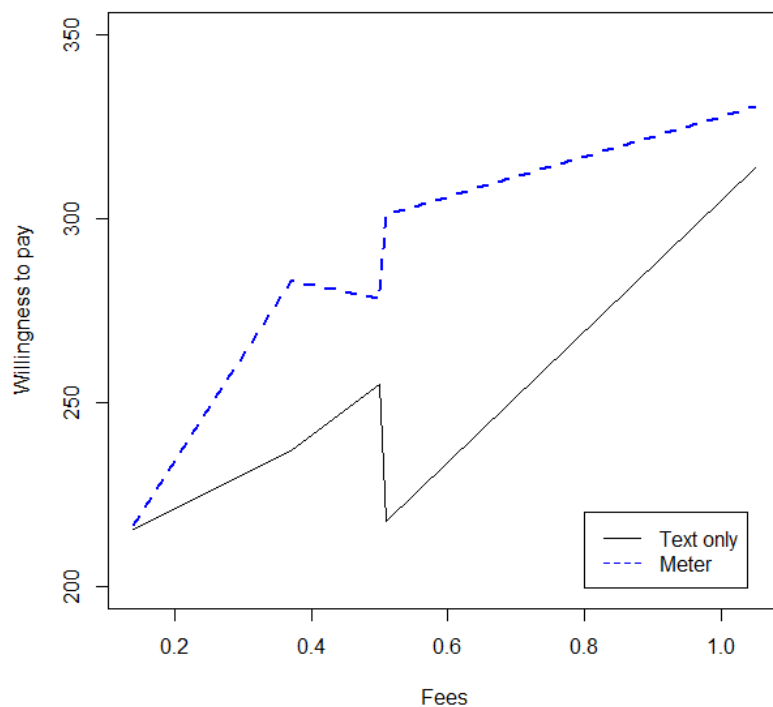
Table 5. Mediation Results Estimating Indirect Effects of Meter and Fee Conditions on WTP.

Meter	-2.83*
	(-6.04, -0.26)
Fee F	9.70***
	(4.76, 15.81)
Fee F * Meter	14.99***
	(7.98, 23.21)
Fee G	17.68***
	(9.55, 26.70)
Fee G * Meter	16.37***
	(8.85, 25.29)
Fee H	18.92***
	(10.37, 28.49)
Fee H * Meter	19.76***
	(10.82, 29.55)
Fee I	30.11***
	(16.85, 44.35)
Fee I * Meter	18.05***
	(9.79, 27.88)

Note. *, **, and *** denote statistical significance based on whether zero is contained in the 95, 99, and 99.9% percentile bootstrap confidence intervals, respectively. The 95% confidence intervals are shown in parentheses.

In addition to the indirect effect operating through cost percentile estimates, we are also interested in the total effect of the fee meters on WTP. Figure 6 plots WTP as a function of the fee level. These results are based on a regression of WTP on the experimental condition (without controlling for cost percentile estimates). While WTP for search is greater for participants that saw a meter, there is a lot of variation in these responses. In particular, differences between participants in the meter conditions and those in the text-only condition are significant at the 5% level for fee F and H, but not at other fee levels.

Figure 6. Effects of Condition on WTP to Search.



Supplementary Results

A question arises regarding why the effects of meters on WTP are relatively weak whereas the indirect effects, through cost percentile estimates, are significant. This section explores several possible explanations for this pattern of results.

#1: Lack of Focus on Fees

It is possible that participants seeing a fee meter are not attempting to minimize fees paid, even if they understand that their fund costs more than other funds. This could occur if participants are unaware of how fees relate to returns or consider other aspects of a fund to be more subjectively important. The study provides some evidence that participants are not focused on minimizing fees, in the form of two survey items that help capture participants' mental models of the relationship between fees and returns. While neither asks specifically about the Middlewood S&P 500 Index fund, we believe that both can provide some insight into how participants may generally approach mutual fund decision making.

First, at the end of the survey, we asked whether participants agree or disagree with the statement "Mutual fund fees have little impact on a fund's performance in the long run." Only 26% of participants disagreed or strongly disagreed (5% strongly disagreed). Yet, as discussed in the literature, fees are a primary factor in net returns, particularly in the case of index funds (e.g., Carlson, et al., 2004; Choi, et al., 2010; Elton, et al., 2004).

Additionally, we asked participants to report their beliefs about the relationship between fees and returns, asking them "Which of the following best describes your view on the

relationship between a mutual fund's expenses and performance?" Possible response options were:

- Funds with higher expenses (i.e., fees) tend to have higher net returns (after expenses)
- Funds with lower expenses (i.e., fees) tend to have higher net returns (after expenses)
- There is no relationship between expenses (i.e., fees) and returns
- I don't know.

In total, 36% of the sample reported that there was no relationship, which raises questions about whether they would have taken the fee meter into account when reporting WTP. In contrast, 20% believed that higher fees would lead to higher returns, 12% believed that lower expenses would yield higher net returns, and the remainder reported "I don't know."

Together, these questions suggest that a lack of perceived importance of fees may limit the relationship between a fee meter and WTP. In the absence of additional education about the relationship between mutual fund fees and returns, or additional emphasis on the benefits of seeking low-cost mutual funds, the overall impact of a fee meter on investors' search behavior may be relatively muted.

#2: Difficulty Estimating and Reporting WTP

A second explanation for the relatively weak relationship between fee display and WTP is that participants may have struggled with the numerical demands required to determine WTP, even if they generally knew that searching for an alternative fund would be preferable. To explore this possibility, we analyze alternative potential outcome measures that may have relieved some of the calculation burden.

Table 6 presents the results of regressions on subjective evaluations of the Middlewood 500 Index Fund, questions where participants respond using one-to-five response scales. As shown, participants viewing a fee meter consistently had more negative responses to high-cost funds across the different measures (indicated by variables representing interactions between Fee Levels F, G, H, and I and Meter). In contrast, participants that did not view a fee meter generally report little difference in their evaluations (indicated by variables for Fee Levels F, G, H, and I). This pattern suggests that the fee meter affected evaluations, helping participants distinguish between low and high-cost funds.

Table 6. Regression Results Estimating Evaluations by Experimental Condition.

	Average evaluation	Interested in fund	Fund seems like a good choice	Fund seems expensive (reverse coded)	Think fund will perform well
Fee F	-0.01 (0.06)	-0.02 (0.09)	-0.01 (0.08)	-0.01 (0.09)	-0.004 (0.07)
Fee G	-0.03 (0.06)	-0.07 (0.09)	-0.03 (0.08)	-0.05 (0.09)	0.03 (0.07)
Fee H	-0.16** (0.06)	-0.19* (0.09)	-0.13 (0.08)	-0.18* (0.09)	-0.13 (0.07)
Fee I	-0.12* (0.06)	-0.08 (0.09)	-0.04 (0.08)	-0.30*** (0.09)	-0.06 (0.07)
Meter	0.12* (0.05)	0.04 (0.07)	0.16** (0.06)	0.30*** (0.07)	-0.01 (0.06)
Fee F * Meter	-0.35*** (0.07)	-0.27* (0.11)	-0.32*** (0.09)	-0.78*** (0.10)	-0.05 (0.08)
Fee G * Meter	-0.43*** (0.07)	-0.32** (0.11)	-0.39*** (0.09)	-0.88*** (0.10)	-0.14 (0.08)
Fee H * Meter	-0.33*** (0.07)	-0.22* (0.11)	-0.31*** (0.09)	-0.85*** (0.10)	0.05 (0.08)
Fee I * Meter	-0.48*** (0.07)	-0.45*** (0.11)	-0.46*** (0.09)	-0.84*** (0.10)	-0.16* (0.08)
Constant	3.42*** (0.04)	3.37*** (0.06)	3.39*** (0.05)	3.23*** (0.06)	3.69*** (0.05)
Observations	4,424	4,424	4,424	4,424	4,424
R-squared	0.10	0.04	0.04	0.16	0.01

Note. *, **, and *** denote statistical significance at the .05, .01, and .001 levels, respectively. Standard errors in parentheses.

Further supporting the idea that WTP may have been difficult to report, we consider an alternative measure of relative cost beliefs that may provide additional insight: a 1-to-5 rating of how expensive the fund is. Table 7 shows that these ratings are systematically related to both fee level and meter condition. In the absence of a fee meter, each of the fee levels is perceived as higher cost than fee level A, on average. These differences are significantly magnified when the fee meter is present. We also conducted a follow-up analysis estimating the indirect effect of these qualitative ratings on WTP, following the same general structure as outlined in the “Estimation” section. This analysis shows that a one-unit change in evaluations leads to an estimated increase in WTP of \$10.28 (*s.e.* = 4.766, $z = 2.16$, $p = .03$) when controlling for experimental condition.

Table 7. Regressions Estimating Effects of Experimental Conditions on Beliefs about Fund Cost.

	Rating for relative cost of fund (1 to 5)	Value of search based on fitted beliefs
Fee F	0.21* (0.09)	35.25*** (9.46)
Fee G	0.49*** (0.09)	65.47*** (9.57)
Fee H	0.48*** (0.09)	76.76*** (9.69)
Fee I	0.87*** (0.09)	269.98*** (9.55)
Meter	-0.50*** (0.07)	-1.26 (7.66)
Fee F * Meter	1.19*** (0.10)	24.83* (10.90)
Fee G * Meter	1.12*** (0.11)	37.79*** (10.98)
Fee H * Meter	1.34*** (0.11)	34.71** (11.07)
Fee I * Meter	1.10*** (0.10)	117.77*** (10.93)
Constant	2.53*** (0.06)	6.16 (6.68)
Observations	4,392	4,359
R-squared	0.34	0.63

Note. *, **, and *** denote statistical significance at the .05, .01, and .001 levels, respectively. Standard errors in parentheses.

Finally, we can also calculate participants' implied WTP to search using their responses to the percentile questions (second column of Table 7). In contrast to the measured WTP analyzed above, the implied WTP relies only on respondents' cost percentile estimates, thereby obviating the need to translate between those estimates and dollars (rather, the value of search is constructed using the calculation outlined in the Methods section). Participants viewing higher cost funds perceive a higher value to search, which is consistent with normative models. Furthermore, these effects are significantly greater for those in the meter conditions, versus those viewing only text-based fee information. All of the coefficients in Table 7 (direct effects on implied WTP) are larger than those in Table 5 (indirect effects on WTP), meaning that the

implied value of search is higher than the reported WTP. Thus, participants' search valuations may not fully reflect their own reported beliefs.

Perceived Helpfulness of Fee Displays

Although the meters may help people understand relative costs, they could also feel more difficult to understand and use than text-based information. We compare the meters with the text fee display on how helpful participants found the fee information, how easy it was to understand, and how well participants felt they understood the fee information. Across the three questions, we do not see consistent differences between the meters and the text fee display. For fee level G, 0.50%, when pooling the meters together, we find they were harder to understand than text ($b = -0.33$, $t(4393) = -2.59$, $p = .010$). Yet for fee level H, 0.51%, we see no differences between the pooled meters and text for how hard they were to understand ($b = 0.03$, $t(4393) = 0.24$, $p = .81$). We find no differences between the pooled meter conditions and the text on the helpfulness ratings (all $ps > 0.05$), and only one difference, at fee level A, on ratings for how well participants understood the information ($b = -0.27$, $t(4393) = -3.20$, $p = .001$). Given the number of non-significant comparisons in this analysis, there do not appear to be systematic differences in the perceived helpfulness of the different fee displays.

4. Conclusion and Discussion

There is significant policy and academic interest in helping investors make more informed decisions about mutual funds. One area of attention is whether investors pay excessive fees on their mutual funds, meaning that they pay higher fees than necessary for products that have equivalent or similar market substitutes. This research examined the potential impact of fee meters on investors' judgments and behaviors, including their knowledge of the relative cost of mutual funds and willingness to search for an alternative fund.

Overall, we find that, in the absence of additional information, consumers are not knowledgeable about the distribution of costs in the mutual fund market (Study 1). Providing them with comparative fee information in the form of a meter substantially improves their understanding of relative costs; in turn, this improved knowledge increases WTP to search for an alternative fund (Study 2). Thus, fee meters strengthen the relationship between the fees and WTP to search for an alternative fund. However, the increases in WTP were small, even for some high-cost funds, suggesting that there may be other barriers to helping investors choose low-cost funds.

Implications for Policy on Mutual Funds and Information Design

Our work contributes to growing behavioral and financial research on consumer-facing information suggesting that, to increase understanding and help people make decisions, disclosures should provide decision makers with meaningful comparisons (e.g., Chin & Bruine de Bruin 2019; Hsee & Zhang 2010; Scholl, Craig, & Chin, 2023). Indeed, mutual fund disclosures already contain comparisons in the form of performance benchmarks, and research

suggests that these comparative disclosures can affect investor evaluations (e.g., Chin, et al. 2022).

Here, we find that showing consumers a fee meter with comparative price information (vs. only text-based information on fees) can lead to more informed investment decisions. Most notably, the meters significantly improve accuracy of relative cost beliefs, reducing the amount by which consumers underestimate the relative costs of high-cost funds. They also reliably affect consumers' evaluations of funds, leading consumers to view low-cost funds more positively. Fee meters increase WTP to search for an alternative fund when investors see certain – but not all – high-cost funds, which could help them save money. These benefits are achieved without increasing the subjective burden of the fee information (as assessed through participants' perceptions of helpfulness and ease of understanding).

At the same time, the benefits of the fee meter were limited in certain cases, suggesting that comparative information alone may not be sufficient for promoting investor welfare. In particular, the fee meter did not change WTP to search across all fee levels, and the changes in WTP were limited when compared to the amount that investors could have saved over a 10-year investment horizon. Our supplemental analyses suggest that investors may be unaware of how fees can negatively impact net returns and may also face difficulties with the numerical calculation needed to translate between the fee meter and subsequent investment-related behavior. Although we did not find any robust differences between investors in how they used the fee meter, there may also be individual-level factors affecting overall efficacy, including difficulties in graphical literacy, reading ability, or numerical skills, that should be further explored.

At the minimum, investors may need education or further disclosure to understand the relationship between fees and net returns, and the implications of high fees for their investment balances. Given that the meter variants tested here generally showed no significant differences, broader changes may be worth testing. To make the impact of fees more concrete, for example, fee meters could display aggregated fees paid (in dollars) under certain performance scenarios (this approach is considered in certain fee meters presented in Scholl, et al., 2023). Although our research does not directly address the impact of presenting fees-in-dollars on investor search behavior, it is possible that such information could increase the impact of fee meters.

Implications for Search Models

We contribute to research on mutual fund fees that has explored the prevalence and persistence of price dispersion (e.g., Cooper, et al., 2021; Hortaçsu & Syverson, 2004; Scholl, et al., 2023), including work that explains price dispersion through search models. Under such models, consumers balance the benefits of search, including finding an improved option, against the cost of search, including the time costs required to find a new option. When searching is costly, meaning that investors do not know the best option and it takes time and effort to understand the market, price dispersion can persist.

Hortaçsu and Syverson (2002) estimate the search costs necessary to explain the market share of higher cost index funds under the assumption that the distribution of fund fees is known, representing a scenario where the benefits of search are easily determined. In contrast, we contribute empirical evidence showing that both investors and non-investors are not knowledgeable about the distribution of fund fees, implying that perceived benefits of search may differ from the actual values. Further, we find that providing fee meters (which provide information about the distribution of fund fees) affects WTP to search, a measure of the perceived benefits of search behavior. Estimated relative costs cause search for an alternative mutual fund – and such search can theoretically lead to funds that provide superior financial outcomes (Appendix A). Thus, we provide analyses of search complementary to Hortaçsu and Syverson (2002), in that we examine perceived benefits of search (based on individual beliefs) and behavior.

Limitations

This research, like all research, has limitations. Our research concentrated on individual consumers' knowledge and responses and does not capture how firms would respond to fee meter displays or associated changes in consumer behavior. Fung, et al. (2007) and Loewenstein, et al. (2014) both make the point that consumer and firm behavior can interact in multiple ways, thus disclosure research should ideally understand both types of parties. Further, researchers have documented firm attempts to combat or obfuscate disclosure requirements (see, e.g., deHaan, et al. 2021, Van Epps & Chin, 2024). To the extent that fee meters became widely-used consumer tools, firms could adapt in multiple ways, including highlighting fees (in situations where fees are relatively low); obscuring fees (in situations where fees are relatively high); shifting their cost structure to rely on fees that are not captured in the fee meter; or adding less comparable, high-fee funds to the set of funds underlying a fee meter to make moderately expensive funds appear relatively cheap. Our research does not have direct evidence on such behaviors, which may be useful to examine in future research.

A second limitation is that we simplified the fee-related information shown to experimental participants, limiting it to the expense ratio and (in certain experimental conditions) the fee meter. The fee information that is currently required in mutual fund prospectuses includes a table that shows a list of fees and a table showing estimated fees over time. It is unclear how the fee meter could interact with this other fee-related information. Similarly, it is unclear whether fee meters would affect investor behavior if they appeared in environments such as advertisements or comparison-shopping websites.

A third limitation is that our experiment focused on index funds. Comparing across index funds that track the same index, higher fees necessarily lead to lower net returns. With actively managed funds, the link between fees and net returns is less clear, although it remains negative in many cases. There may be other factors that make two actively managed funds less comparable, making it important to ensure that fee meters capturing actively managed funds

remain useful as a decision tool. To isolate the impact of the fee meter in current research, we chose to use index funds, thereby making the funds more comparable.

Concluding remarks

The mutual fund market underlies financing for many important life outcomes, including education and retirement security. Given the range of fees charged on mutual funds, and the corresponding consequences for investor welfare, it is important to ensure that investors are making well-informed decisions about mutual fund costs. Standardized labels play a crucial role in communicating information and facilitating consumer decision-making, helping investors who may otherwise struggle to navigate these complex decisions.

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Appendices

Appendix A. Theoretical Model Illustrating that Information about the Distribution of Costs Drives Search Behavior

In a search model, investors' search behavior is determined by a tradeoff between the marginal costs of search, which could include time and financial costs, and the marginal benefits of search, which are determined by price dispersion and their ability to access a lower-cost option; such models date back to Stigler (1961; see review in Chade et al., 2017).

Our search model takes the following specific form. Imagine that an investor is searching for an S&P 500 index fund. Since all funds have the same expected gross returns and risk, the investor's objective is to maximize net returns, which she can accomplish by minimizing fees.¹⁸ To identify potential investments, the investor searches by making random draws from the distribution of S&P 500 index fund *fees*, where the distribution is unknown. Specifically, every time the investor searches, she makes a new draw of fees from the distribution $F(x)$, which has support over x_0 to \bar{x} . For every draw except for the first, the investor must pay a search cost of C . This cost includes the time that would be spent conducting the search and would vary among investors. We assume that investors understand the effect of fees on returns and have the analytical ability to incorporate fees into their expectations of returns from investing in the fund. This assumption allows us to explore optimal responses for investors.

The investor does not know the distribution $F(x)$ but has prior beliefs $\tilde{F}(x)$, which are updated after each draw, with $\tilde{F}(x|x_1)$ denoting beliefs after observing draw x_1 .¹⁹ For the investor's prior $\tilde{F}(x)$, we use a Dirichlet process, as in Bikhchandani and Sharma (1996) and De Los Santos et al. (2017), with based measure $H(x)$ and concentration parameter W .²⁰ A Dirichlet process prior can be interpreted as a distribution over distributions (Ferguson, 1974). For our purposes, the key feature of the Dirichlet process prior is how this prior is updated after viewing draws from the distribution. The investor's best guess about the distribution $F(x)$ (i.e., the posterior predictive distribution) is a mixture of the based measure $H(x)$ and the empirical distribution with mixture weights determined by W . This means that after viewing one fund's fees x_1 , beliefs about the average fund fee are shifted toward the observed fee. If the investor's

¹⁸ There may be other fund factors that affect investor utility (e.g., fund age as in Hortaçsu and Syverson (2004)), but we do not consider these factors here to match our experimental setting where the only difference between funds is the fees that are paid.

¹⁹ This is a slight departure from the search model in Hortaçsu and Syverson (2004), in which the distribution $F(x)$ is known. The first work on sequential search where $F(x)$ is unknown is Rothschild (1974).

²⁰ We say that G is distributed according to a Dirichlet process $G \sim \text{DP}(W, H)$ if for any finite measurable partition (A_1, A_2, \dots, A_N) ,
 $(G(A_1), G(A_2), \dots, G(A_N)) \sim \text{Dir}(WH(A_1), WH(A_2), \dots, WH(A_N))$,
where $\text{Dir}(\cdot)$ is the Dirichlet distribution.

prior is relatively uninformative (captured by a small concentration parameter W and diffused base measure $H(x)$), posterior beliefs will be centered on or near x_1 .

We define the expected utility that an investor receives from investing in a fund with fees x as $U(x)$, where $U(x)$ is strictly decreasing in x . The investor continues to search after seeing the first draw if the expected gain from making a new draw (in terms of obtaining a fund with a lower fee) exceeds the search cost:²¹

$$C < \int_{x_0}^{x_1} U(x) - U(x_1) d\tilde{F}(x|x_1).$$

The integral on the right-hand side of the inequality is the investor's WTP to search. We assume investors recall earlier draws, so that only the lowest observed fee is relevant when deciding whether to continue the search. After t time periods, where the lowest fee observed after t draws is x^* , the stopping rule becomes:

$$C < \int_{x_0}^{x^*} U(x) - U(x^*) d\tilde{F}(x|x_1, \dots, x_t).$$

Clearly, the investor obtains higher (average) utility when the distribution is known than when expectations are used in place of the actual distribution, because they know when to incur search costs to search for a lower cost fund and will select lower cost funds when available. It is less clear how incomplete information about the distribution would affect welfare, as there are two effects on beliefs. First, learning that x_1 is in the high (low) end of the distribution will increase (decrease) perceived benefits of search, as the expected gain from making a new draw varies accordingly. Second, having more information about the distribution will decrease uncertainty. This is intuitive in that a flatter distribution will place more probability on receiving low draws of fees than a distribution that is more concentrated around x_1 . Bikhchandani and Sharma (1996) show that WTP to search is greater when there is greater uncertainty (as measured by second-order stochastic dominance). Combining the two effects means that, on net, information that moves beliefs about the distribution downward (i.e., increasing perceived benefits of making a new draw), will increase WTP to search as long as the associated decrease in uncertainty is not too great.

Does Information Impact the WTP to Search?

Next, we consider the possibility that investors are randomly endowed with information about fees available in the market. This allows us to address the policy question: how would we expect consumers to change their search behavior if they were provided with information about the distribution of fees available in the market?²² To formally state the impacts of additional

²¹ An important point from Rothschild (1974) is that this stopping rule does not hold for all possible prior distributions. Bikhchandani and Sharma (1996) show that Dirichlet process priors satisfy this property.

²² In the propositions that follow, we consider the provision of a single additional piece of information. In the fee meters considered in the remainder of our paper, consumers receive multiple additional pieces of information about the distribution available. However, only the lowest known fee affects the WTP to search. Therefore, the receipt of any number of draws from the distribution is equivalent to the receipt of the lowest draw from the distribution.

information about the distribution, we consider the effects of being endowed with a single additional random draw from the distribution of fees available in the market. We assume that this endowment of information only provides investors with information about the distribution of fees available, but does not offer them the option to invest in a fund with that fee, or require that the investor pay a search fee. This is similar to receiving information provided by a fee meter.

If the lowest fee observed during search was x^* and the investor is endowed with additional information about the distribution in the form of a random draw from the distribution, x_e , without the option of selecting this item, what impact would knowledge of x_e have on WTP to search? This additional endowed draw x_e provides only a small amount of additional information about the distribution.

Proposition 1. If the expected utility from the investment with fees x_e , $U(x_e)$, is greater than the expected utility obtained from a draw with fees less than x^* , $E[U(x) | x < x^*]$ (where this expectation is taken with respect to the posterior), then the additional endowed information provided by x_e increases WTP to search.

Proof: We will show that $U(x_e) > E[U(x) | x < x^*]$ is a sufficient but not necessary condition for WTP to search to increase in response to updating beliefs based on x_e . WTP to search without x_e is

$$\frac{W}{W+t} P(x < x^*) (E[U(x) | x < x^*] - U[x^*]).$$

The probability $P(x < x^*)$ and the expectation $E[U(x) | x < x^*]$ are taken with respect to the base measure of the Dirichlet process prior. Note that we have expressed WTP to search as the value after t draws from the distribution. The lowest fee obtained so far in the search is denoted as x^* . After updating based on x_e , WTP to search is:

$$\frac{W}{W+t+1} P(x < x^*) (E[U(x) | x < x^*] - U[x^*]) + \frac{t+1}{W+t+1} \frac{1}{t+1} (U[x_e] - U[x^*]).$$

The weight placed on the empirical distribution is $(t+1)/(W+t+1)$. Since there is only one value observed that is less than x^* , the probability of this value is $1/(t+1)$ and its expected value is x_e . WTP to search after updating based on x_e is greater when

$$\frac{W}{W+t} P(x < x^*) (E[U(x) | x < x^*] - U[x^*]) < U[x_e] - U[x^*].$$

Since

$$\frac{W}{W+t} P(x < x^*) < 1,$$

a sufficient condition is that $U(x_e) > E[U(x) | x < x^*]$.

□

Intuitively, if the investor becomes aware of the existence of lower fee funds, which would provide higher utility, they will be willing to pay more for an additional draw from the distribution, because they know that there is a chance that the next draw will offer a fund with a lower fee. Note that the expectation $E(U[x] / x < x^*)$ does not depend on the minimum of the previous draws x_1 to x_t , x^* . Draws greater than x^* provide no information about the values of the distribution below x^* . Observing a low value of x_e causes the investor to place more probability on the lower end of the fee distribution. This provides insights about the setting where the meter reveals that initial draw x_1 is on the high end of the distribution. The next proposition provides the intuitive result that putting more weight on higher fees decreases perceived gains from search.

Proposition 2. If the expected utility from the investment with fees x_e , $U(x_e)$, is less than the utility from the investment with fees x^* , $U(x^*)$, then viewing the additional information provided by x_e decreases WTP to search.

Proof: WTP to search without x_e is

$$\frac{W}{W+t} P(x < x^*) (E[U(x) | x < x^*] - U[x^*]).$$

As before, the probability $P(x < x^*)$ and the expectation $E[U(x) | x < x^*]$ are taken with respect to the base measure of the Dirichlet process prior. If x_e is greater than x^* , it provides no additional information about the distribution below x^* . WTP to search after updating based on x_e is

$$\frac{W}{W+t+1} P(x < x^*) (E[U(x) | x < x^*] - U[x^*]).$$

This quantity is clearly less than the WTP to search without updating based on x_e .

□

This second proposition tells us that the perceived benefits of search decreases when an investor learns that high fees are more likely than previously thought.

Does Information Improve Investor Utility?

Learning that the initial draw is a high or low fee fund can affect WTP to search, but how does this translate to investor utility? We provide a simple example to show how information affects the fund that investors ultimately choose and the search costs that they pay. We use distribution of S&P 500 mutual fund fees available to retail investors described in the introduction and compare an investor that begins with knowing the distribution to an investor that begins with a Dirichlet process prior with a base measure that is uniformly distributed

between the minimum and maximum fee and a concentration parameter of 10. The search cost is set to \$100. As in our experiment, a \$10,000 investment will be made for 10 years. For simplicity, we use a known annual return of 12% for the investment. Using a known return eliminates the need to specify the risk aversion of the utility function. As in the search model, all random draws are made from the distribution of fees in the market.

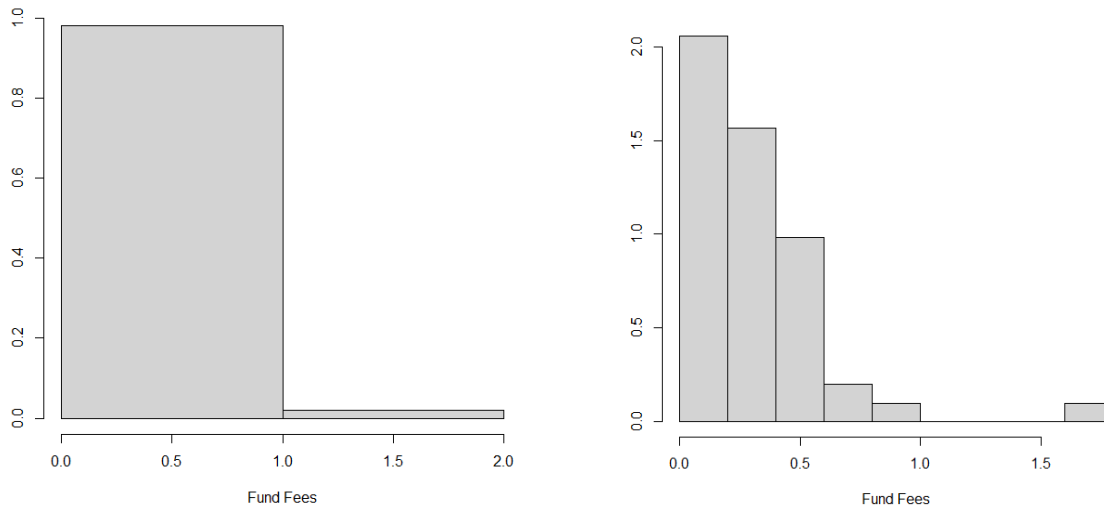
We consider a situation where investors know the lowest and highest possible fees in the market, and vary how much information they have about the distribution. We capture varying degrees of knowledgeable about the distribution of fees using histograms with varying numbers of knots, denoted as $\xi_0, \xi_1, \dots, \xi_k$. These histograms will capture uncertainty about where the mass of the distribution is located. Fees range from 0% to 1.61%, as in the empirical distribution of S&P 500 index funds shown in Figure 1. The knots are spaced evenly over this domain. The histogram is defined as

$$h(y) = \sum_{h=1}^k 1(\xi_{h-1} < y < \xi_h) \frac{\pi_h}{\xi_h - \xi_{h-1}},$$

where $1(\cdot)$ is the indicator function and π_h is the portion of fees between knots ξ_{h-1} and ξ_h .

Figure A1 presents the histograms for k equal to 2 and 10. The histogram with k set to 2 misses the concentration of funds with low fees. As k increases, the concentration of low fees becomes more apparent.

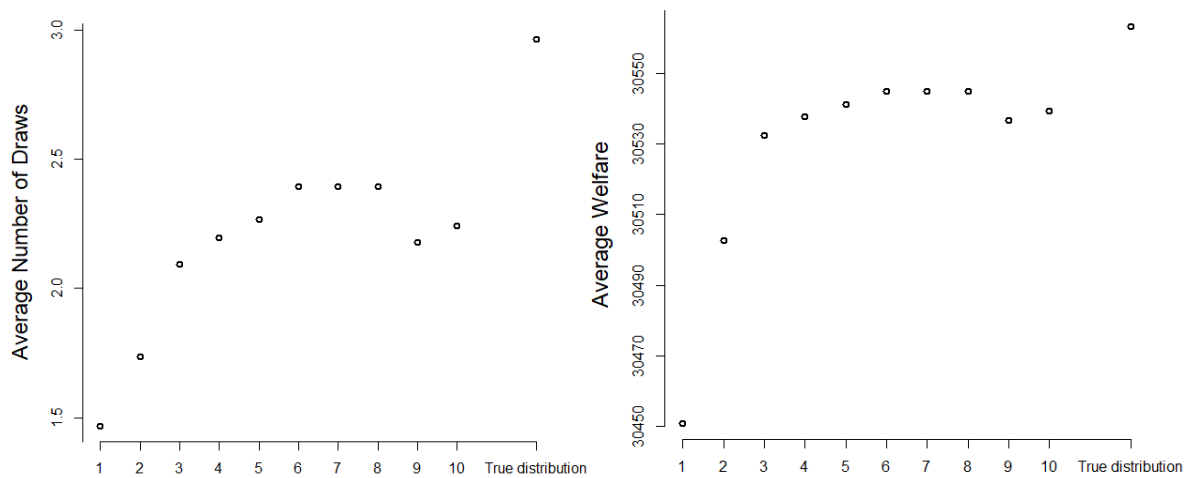
Figure A1. Histograms of the Distribution of Fund Fees with Varying Numbers of Knots.



Note. The histogram on the left sets k to two, resulting in two bins. The histogram on the right sets k to ten.

We ran 150,000 iterations of our simulation. The average number of draws and average welfare obtained across simulations for histogram approximations to the distribution of fees with k varying from 1 to 10 are presented in Figure A2. Welfare is defined as the returns from the investment (net of fees) minus search costs that were paid. We also plot the average number of draws and welfare that are obtained when the true distribution $F(x)$ is known. Because the distribution of fees is right skewed and concentrated on lower fees, a belief that this distribution is flatter results in insufficient searching for lower cost funds, resulting in lower welfare. With the least information ($k = 1$), the average number of draws is only 1.5. With knowledge of the true distribution, the average number of draws is 3. This difference in search behavior translates to differences in welfare. The lowest welfare is obtained when there is the least searching.

Figure A2. Average Number of Draws and Welfare for Varying Uncertainty about the True Distribution.

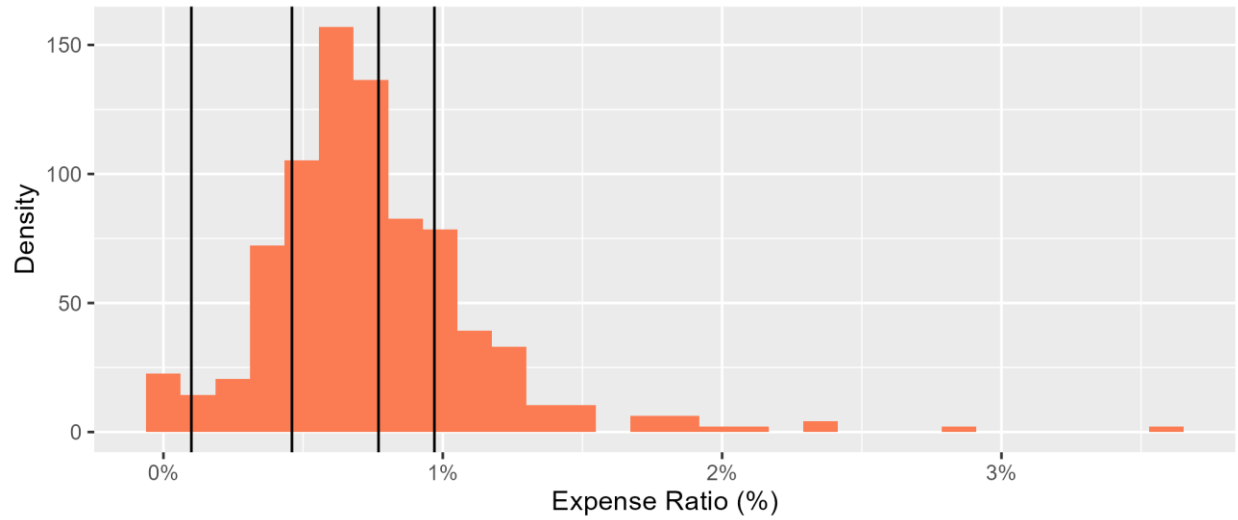


Note. Graphs are based on 150,000 simulations. Beliefs are modeled with a Dirichlet process distribution using a histogram for the base measure and concentration parameter set to 10. Results when the true distribution is known are also presented. The horizontal axis is k , the number of bins, with the true distribution shown at the end of the axis.

Appendix B: Additional Information Pertaining to Study 1

Background on Expense Ratios

Figure B1. Distribution of Expense Ratios for No-Load, Non-Institutional, Actively Managed U.S. Funds without Loads.



Note. This figure shows the distribution of expense ratios for no-load, non-institutional share classes of actively managed US funds. The black lines show values of .46, .77, .97, and 1.00 — the values used in Study 1.

Table B1. Regressions of Participant Cost Percentile Estimates for S&P 500 Index Funds on Investor Status, Mutual Fund Ownership, and Subjective Knowledge of Fees.

	(1)	(2)	(3)	(4)	(5)	(6)
True percentile = 55	-3.55 (4.49)	6.04 (12.90)	-3.81 (4.50)	-2.10 (6.11)	-3.86 (4.49)	-5.20 (5.62)
True percentile = 75	-8.52 (4.63)	-8.66 (12.44)	-9.24* (4.62)	-10.47 (6.40)	-9.47* (4.62)	-9.30 (5.96)
True percentile = 77	-2.40 (4.45)	8.00 (12.44)	-2.99 (4.45)	-2.21 (6.20)	-3.03 (4.44)	-4.23 (5.64)
Respondent is an investor	5.98 (4.27)	12.10 (10.82)				
True percentile = 55 interacted with Investor		-10.96 (13.77)				
True percentile = 75 interacted with Investor		0.99 (13.42)				
True percentile = 77 interacted with Investor		-12.10 (13.33)				
Respondent is a Mutual Fund owner			2.89 (3.13)	3.75 (6.65)		
True percentile = 55 interacted with Mutual Fund owner				-3.77 (9.05)		
True percentile = 75 interacted with Mutual Fund owner				2.42 (9.28)		
True percentile = 77 interacted with Mutual Fund owner				-1.61 (8.93)		
High subjective knowledge of Mutual Fund fees					4.12 (3.21)	2.27 (6.93)
True percentile = 55 interacted with Subjective knowledge of fees						3.73 (9.40)
True percentile = 75 interacted with Subjective knowledge of fees						-0.04 (9.51)
True percentile = 77 interacted with Subjective knowledge of fees						3.19 (9.21)
Constant	39.39*** (5.05)	33.90** (10.24)	43.42*** (3.60)	43.02*** (4.50)	43.28*** (3.49)	43.94*** (4.12)
Observations	429	429	429	429	429	429
R-squared	0.014	0.019	0.012	0.013	0.014	0.014

Note. *** p<0.001, ** p<0.01, * p<0.05. Standard errors in parentheses.

Table B2. Cost Percentile Estimates and True Cost Percentiles for Actively Managed Funds (Study 1)

	A	B	C	D	Average
Expense Ratio	0.46	0.77	0.97	1	0.81
True cost percentile	19	62	79	81	61
Respondents who saw actively managed fund first (N = 503)					
Cost percentile estimate	47	39	45	46	44
SD of cost percentile estimate	(33)	(32)	(40)	(41)	(37)
Error (Estimate - True percentile)	28	-23	-34	-35	-18
Non-response	22%	22%	20%	22%	21%
Cost percentile estimate =50	9%	10%	9%	11%	10%
All respondents (N = 1017)					
Cost percentile estimate	43	42	42	41	42
SD of cost percentile estimate	(32)	(33)	(40)	(40)	(36)
Error (Estimate - True percentile)	24	-20	-37	-40	-19
Non-response	24%	25%	25%	23%	24%
Cost percentile estimate =50	9%	7%	7%	9%	8%

Note. SD = standard deviation.

Appendix C: Additional Information Pertaining to Study 2

Qualitative Pilot Study

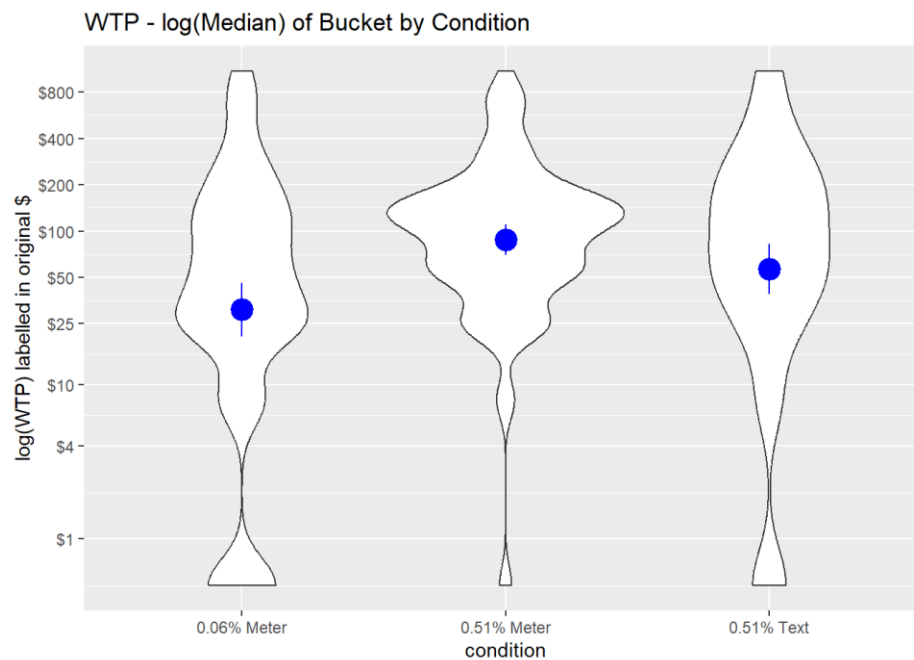
To inform the development of our survey, we conducted one-on-one semi-structured interviews with 13 participants in March 2024. Interviews were conducted online with the moderator and lasted approximately 30 minutes each. The moderator asked participants to read through the study, answer questions, and explain their thinking. Follow-up questions concentrated on participants' understanding of the experimental set up, WTP and other potential areas of confusion. In response to the interviews, we made iterative changes to the overall survey instrument, including wording improvements.

Quantitative Pilot Study #1

We conducted a pilot study on NORC with 319 participants in April 2024. The primary purpose of this study was to ensure fielding fidelity by testing back-end components and survey programming. We also used some open-ended responses from this study to create multiple choice questions for subsequent surveys, thereby reducing respondent burden. As the overall experimental setup is similar to the study described in the main text, we provide a brief summary of the methodology and select results.

Participants were randomized to one of three conditions: (1) a continuous meter with a 0.06% expense ratio, (2) a continuous meter with a 0.51% expense ratio, or (3) a text-only condition with a 0.51% expense ratio. They then answered questions on evaluations, relative cost beliefs, willingness to pay (with 16 bins ranging from (\$0, \$1] to [1,000, ∞)), and follow-up questions. Overall, the results were suggestive that willingness to pay to search for another fund was higher for participants viewing a fund with a 0.51% expense ratio, when they also saw a fee meter, as shown in the graph below.

Figure C1. Willingness to Pay by Condition (Pilot Study #1)



When explaining their willingness to search in response to an open-ended question, participants stated a variety of explanations. These included attention to fees, the risks associated with gambling, and a general unwillingness to pay to search:

- “I can see the performance of Middlewood. Fees are low. Searching for another fund has a gamble associated with it.” (Participant in the 0.06% fee meter condition)
- “Didn’t want to pay any money for a search. Searching should be free!” (Participant in the 0.06% fee meter condition)
- “The management fee is about \$50 and is among the highest ones. If that’s the highest, I wouldn’t save more than \$50 by switching, so it doesn’t make sense to spend that much to search for another fund. I have a harder time figuring out if it’s worth it based on the returns.” (Participant in the 0.51% meter condition)

Overall, 98% of participants completing the study on a desktop computer (n = 198) stated “yes” in response to the statement, “I saw the information about the Middlewood Fund clearly on my screen,” as did 93% of participants completing the study on a mobile device (n = 121).

Quantitative Pilot Study #2

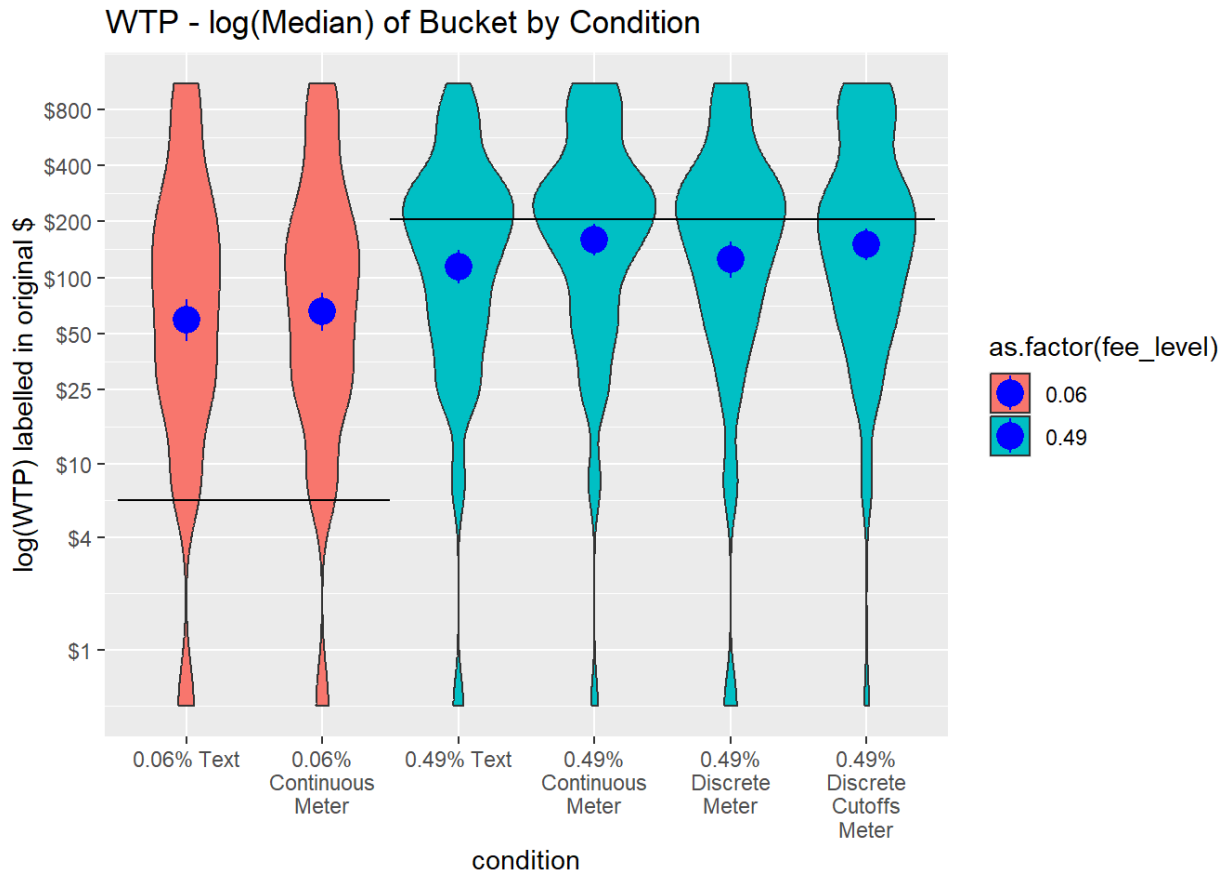
We conducted a pilot study with 1216 participants on Prolific Academic, a commonly used platform for social science research, in April 2024. Participants were randomized to one of six conditions:

1. Continuous meter with 0.06% expense ratio

2. Text info with 0.06% expense ratio
3. Text info with 0.49% expense ratio
4. Continuous meter with 0.49% expense ratio
5. Discrete meter with 0.49% expense ratio
6. Discrete, labeled meter with 0.49% expense ratio

Participants were asked to answer questions akin to those in the final study. Results were suggestive of a higher WTP among participants considering a fund with a 0.49% expense ratio, relative to those who had been assigned a fund with a 0.06% expense ratio, as shown in the graph below.

Figure C2. WTP to Search by Condition.



Examples of All Fee Meters

Figure C3. Continuous Meter

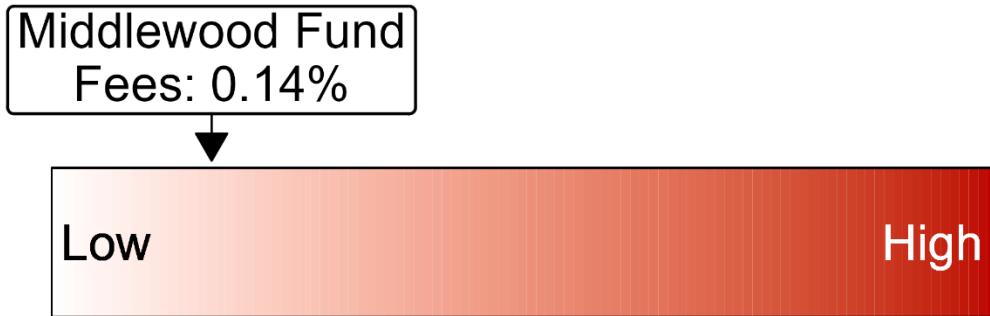


Figure C4. Discrete Meter

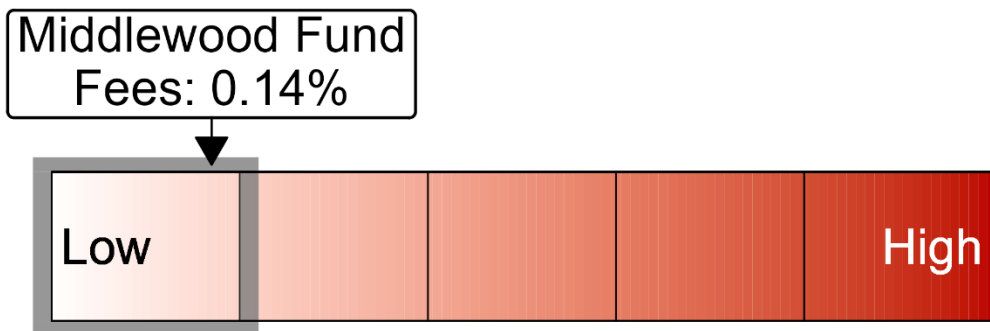
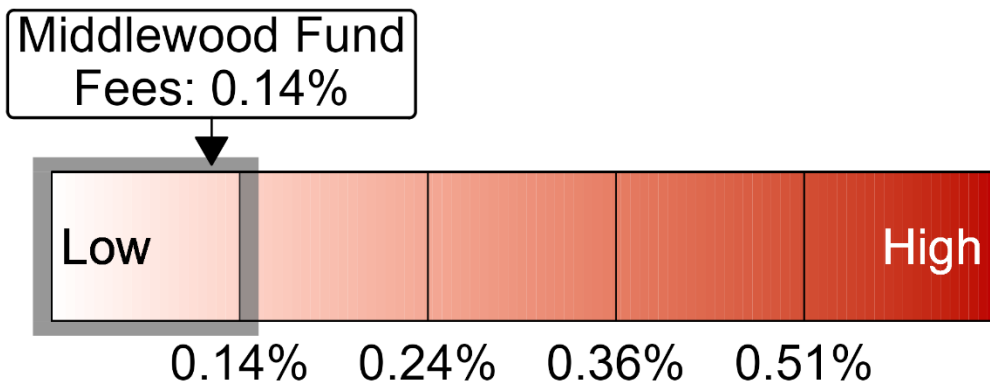


Figure C5. Labeled Meter



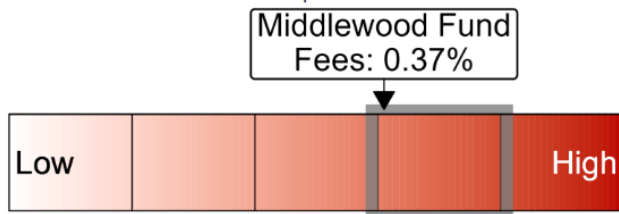
Survey Instrument for Select Questions

Figure C6. Example Fund Information Screen. (Fee 0.37% and Continuous Meter).

The Middlewood 500 Index Fund

About this Fund: The Middlewood 500 Index Fund allows you to gain diversified exposure to the U.S. equity market. The fund offers exposure to 500 of the largest U.S. companies, which span different industries and account for about three-fourths of the U.S. stock market's value. The Middlewood 500 index fund is passively managed. It tracks the S&P 500 index.

Fees and expenses: The annual fees of the Middlewood 500 Index Fund are 0.37%. A fee of 0.37% on a \$10,000 investment is \$37. The fee meter below shows how the fees of the Fund compare to other S&P 500 Index Funds.



Risk factors:

- You could lose money by investing in the fund.
- The Middlewood S&P 500 Index Fund is exposed to overall market risk through its exposure to the US economy.
- The fund seeks to track the performance of the index. It will not change its holdings in an attempt to take advantage of market opportunities or lessen the impact of market declines. The performance of the fund and the S&P 500 Index may vary due to factors such as the fund's fees and expenses, and transaction costs.

Performance: Cumulative Growth of \$10,000

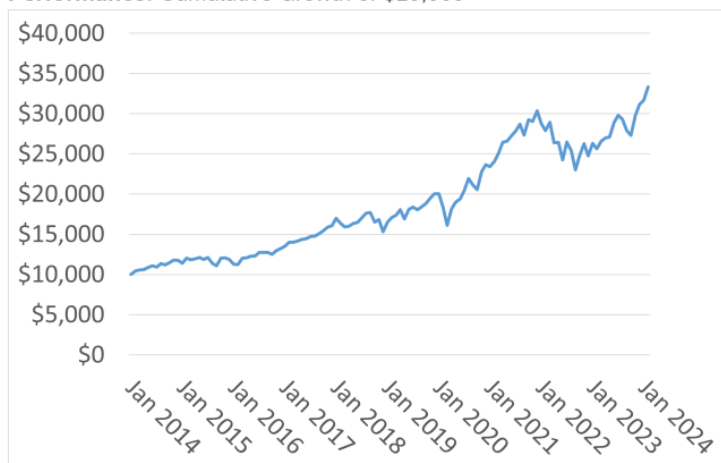


Figure C7. Screenshot of Evaluation Questions.

After seeing that information about the Middlewood 500 Index Fund, how much do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
This fund seems expensive.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am interested in investing in this fund.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think this fund will perform well over the next 10 years.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Most index funds have roughly the same fees and performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This fund seems like a good choice compared with funds that have a similar strategy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure C8. Cost Percentile Estimate Questions.

The fee meter below shows how the fees of the Middlewood Fund compare to other S&P 500 Index Funds.



Suppose there are 100 S&P 500 Index Funds, ordered from lowest fee to highest fee. These 100 funds mirror exactly what you can find in the market.

If one of the mutual funds has fees of 0.14%, how many funds would be cheaper than that fund?

I believe that (out of 100) funds would be cheaper

If one of the mutual funds has fees of 0.37%, like the Middlewood fund, how many funds would be cheaper than that fund?

I believe that (out of 100) funds would be cheaper

If one of the mutual funds has fees of 0.51%, how many funds would be cheaper than that fund?

I believe that (out of 100) funds would be cheaper

If one of the mutual funds has fees of 1.05%, how many funds would be cheaper than that fund?

I believe that (out of 100) funds would be cheaper

Note: This is a screenshot of the relative cost elicitation questions for a participant assigned to Fee Level F (i.e., 0.37%) and a continuous fee meter condition.

Figure C9. First WTP Question for an Alternative Fund.

Would you be willing to pay **\$100** of your hypothetical \$10,000 to see a different fund?

Paying \$100 would be better:

- If the other fund has fees at least 0.106% lower than the Middlewood Fund,
or
- It outperforms the Middlewood Fund by 0.106% per year or more

Paying \$100 would be worse:

- If the other fund has fees that are not 0.106% lower
or
- It does not outperform the Middlewood Fund by at least 0.106%.

Yes

No

Note: This is a screenshot of the first WTP question participants received. On the survey page, participants also saw the fee information according to their condition (i.e., fee level and fee display).

Supplementary Results from Study 2

Sample Demographic Statistics for Included and Excluded Participants

Table C1. Demographics of Participants Included and Excluded from Analysis Sample.

Characteristic	Excluded, N = 2,663 ¹	Included, N = 4,424 ¹
Respondent gender		
Unknown	0 (0%)	0 (0%)
Male	954 (36%)	2,218 (50%)
Female	1,709 (64%)	2,206 (50%)
Education		
Less than HS	111 (4.2%)	112 (2.5%)
HS graduate or equivalent	506 (19%)	593 (13%)
Some college/Associate's degree	1,088 (41%)	1,535 (35%)
Bachelor's degree	551 (21%)	1,232 (28%)
Post grad study/professional degree	407 (15%)	952 (22%)
Respondent age	51 (17)	50 (16)
¹ n (%); Mean (SD)		

The Effects of Fee Meters on WTP Do Not Systematically Vary by Design Elements (RQ5)

We estimate our double bounded regression for WTP while including regressors for whether the meter was discrete or labeled in Table C1. The effects of adding discrete lines and labels to the meter mostly are in the expected, positive direction but there is considerable variation in responses to these display features. None of the effects of adding these features is significant at the .05 level.

Table C2. Regression Results of WTP on All Fee Displays.

	WTP
Fee F	21.27 (28.13)
Fee G	39.63 (28.47)
Fee H	2.231 (28.81)
Fee I	98.30*** (28.48)
Meter	-3.860 (28.02)
Discrete	13.27 (27.82)
Label	-11.45 (27.18)
Fee F * Meter	32.22 (39.96)
Fee F * Discrete	37.86 (40.23)
Fee F * (Label Meter)	-33.76 (39.26)
Fee G * Meter	47.78 (40.24)
Fee G * Discrete	-65.62 (40.01)
Fee G * (Label Meter)	53.95 (39.40)
Fee H * Meter	113.3** (40.49)
Fee H * Discrete	-46.01 (39.75)
Fee H * (Label Meter)	0.894 (38.80)
Fee I * Meter	26.52 (40.00)
Fee I * Discrete	-26.19 (39.34)
Fee I * (Label Meter)	19.54 (38.85)
Constant	215.4*** (19.78)
Observations	4,450

Note. Standard errors in parentheses. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

The Effects of Fee Meters on WTP Do Not Systematically Vary by Investor Status or Numeracy (RQ6)

Table C3. Regression Results Showing Effects of Experimental Condition on WTP by Subgroups.

	Investors	Non- investors	High numeracy	Low numeracy
Fee F	16.88 (29.47)	76.94 (93.77)	7.986 (39.59)	32.44 (40.00)
Fee G	42.71 (29.94)	20.46 (91.18)	39.78 (38.30)	41.66 (42.43)
Fee H	16.91 (30.39)	-98.91 (89.88)	15.51 (39.08)	-10.96 (42.48)
Fee I	112.1*** (30.05)	27.56 (87.86)	68.02* (38.24)	143.3*** (42.48)
Meter	8.231 (23.96)	-55.76 (72.42)	13.55 (31.58)	-9.730 (32.70)
Fee F * Meter	48.05 (33.88)	10.40 (109.8)	57.58 (45.46)	35.63 (46.27)
Fee G * Meter	18.28 (34.34)	59.22 (107.3)	29.70 (44.33)	13.85 (48.48)
Fee H * Meter	64.73* (34.63)	214.6** (106.5)	70.06 (44.61)	93.17* (48.70)
Fee I * Meter	13.93 (34.37)	25.19 (103.2)	53.26 (43.98)	-37.42 (48.49)
Constant	212.5*** (21.00)	230.5*** (59.01)	211.5*** (27.64)	218.3*** (28.28)
Observations	3,912	542	2,166	2,288

Note. Our three numeracy questions are based on Cokely et al. (2012). High and low numeracy are defined by a median split on the number of correct answers. Specifically, the median number answered correctly is one, so “High numeracy” is defined as two or three questions answered correctly and “Low numeracy” is one question or no questions answered correctly.