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THE KNOWLEDGE GAP IN WORKPLACE RETIREMENT INVESTING AND THE ROLE OF PROFESSIONAL ADVISORS

JILL E. FISCH†
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ABSTRACT

The dramatic shift from traditional pension plans to participant-directed 401(k) plans has increased the obligation of individual investors to take responsibility for their own retirement planning. With this shift comes increasing evidence that investors are making poor investment decisions.

This Article seeks to uncover the reasons for poor investment decisions. We use a simulated retirement investing task and a new financial literacy index to evaluate the role of financial literacy in retirement investment decisionmaking in a group of nonexpert participants. Our results suggest that individual employees often lack the skills necessary to support the current model of participant-directed investing. We show that less knowledgeable participants allocate too little money to equity, engage in naive diversification, fail to identify dominated funds, and are inattentive to fees. Over the duration of a retirement account, these mistakes can cost investors hundreds of thousands of dollars.

We then explore the capacity of professional advisors to mitigate this problem. Using the same study with a group of professional advisors, we document a predictable but nonetheless dramatic knowledge gap.
between professionals and ordinary investors. The professional advisors were far more financially literate and made better choices among investment alternatives. Our results highlight the potential value of professional advice in mitigating the effects of financial illiteracy in retirement planning. Our findings suggest that, in weighing the costs of heightened regulation against the value of reducing possible conflicts of interest, regulators need to be sensitive to the knowledge gap.

INTRODUCTION

The workers of the next generation face a new challenge—saving for their own retirement. In the past, workers were able to rely on a combination of employer-provided pensions, also known as defined-benefit plans, and social security. Today the vast majority of workers will have to depend on the balances in their 401(k) plans and individual retirement accounts (IRAs)—plans in which they are individually responsible for choosing both how much money to save for retirement and how to allocate that money among a range of investment options. Participant-directed retirement-savings plans may increase employee autonomy and reduce the potential that employees will be the victim of pension-plan underfunding or employer conflicts of interest. There are reasons to think, however, that the task is so complex that most retail investors make predictable and systematic mistakes at a real cost to their financial well-being. Indeed, commentators report that the shift to employee-directed retirement savings has resulted in “the greatest retirement crisis in history” in which many elderly Americans will have insufficient retirement savings to meet their needs.

Solutions to these problems are highly contested. One possible response is improved disclosure—the dominant approach to investor protection reflected in the federal securities laws. Yet it is unclear


whether disclosure is useful to investors who do not understand the task at hand or the material they must evaluate. Some commentators have called for more investor education to increase financial literacy and, indeed, a variety of organizations are focusing their efforts on investor education. To date, however, studies have found that investor education has limited value in improving investing performance.

Another option is more extensive regulation. The Supreme Court’s recent decision in Tibble v. Edison International, which imposed a continuing duty on the part of employers to monitor and improve the investment options they offer in 401(k) plans, is an example. The U.S. Department of Labor (DOL) took a similar approach in adopting its 2016 fiduciary rule, which mandates greater compliance obligations for those who provide investment advice in connection with retirement plans.

Retirement investing presents particular regulatory challenges because the core principles are themselves contested. Commentators do not agree on the appropriate amount of retirement savings, the acceptable degree of risk for a retirement portfolio, or the return that workers should expect to earn over the course of their lifetimes. Department of Labor (DOL) has also emphasized increased disclosure. See, e.g., U.S. DEP’T OF LABOR, Fact Sheet: Final Rule to Improve Transparency of Fees and Expenses to Workers in 401(k)-Type Retirement Plans (Feb. 2012), http://www.dol.gov/ebsa/pdf/fsparticipantfeerule.pdf

4. See infra notes 46–51 and accompanying text (describing these efforts).
5. See infra note 52 (citing studies).
7. Id. at 1828.
Economic fluctuations can change the relative payoffs of different investment choices, and financial innovation continues to produce new and complex products for investors to evaluate.\(^\text{13}\) Scholars debate the effectiveness of market forces in disciplining the fees associated with professional advice.\(^\text{14}\) At the same time, a particular employee’s needs may be driven by individualized factors.\(^\text{15}\) In light of these challenges, it is difficult to set appropriate objectives for workplace financial literacy, to determine what type of guidance to provide to workers, or even to evaluate the quality of an individual worker or retirement plan’s investment choices.\(^\text{16}\)

A necessary first step for addressing these challenges is understanding the process better. Specifically, it is necessary to identify the particular mistakes that ordinary investors make and why they make those mistakes.\(^\text{17}\) To analyze these questions, we construct and apply a new financial literacy index, using questions tailored to the task of choosing among investment options in an employer-sponsored retirement plan. We consider the role of financial literacy in addition to standard demographic characteristics, investor numeracy, and risk aversion.

Our study supports the critical explanatory power of financial literacy reported by other work in this field. Financial literacy, measured through our index, is the strongest predictor of investment decisionmaking measured across multiple dimensions. Although age, gender, education, and investing experience are all highly correlated,
financial literacy is a strong predictor of returns even holding these demographic variables constant. That is, financial literacy matters even within demographic categories. Men or women, young or old, people make better retirement investment choices when they know something about the options available to them—including what an index fund is, what a bond fund is, and which investments are associated with higher or lower risk and returns.

By drilling down into the decisionmaking process, our study sheds new light on the reasons why ordinary investors make costly mistakes. We show that financially illiterate investors allocate too little money to equity, engage in naive diversification, fail to identify dominated funds, and are inattentive to fees. These mistakes can be costly. For example, merely investing $10,000 in an equity fund with a 2 percent instead of a 1 percent expense ratio will cost an investor a difference of $28,000 over a thirty-year investment.

One method of addressing these limitations is through the assistance of professional advisors. In the retirement industry, professional advisors serve a variety of functions: they advise businesses on how to set up appropriate 401(k) plans, they provide investor education to employees eligible to participate in such plans, and they provide advice to retail investors outside the employment context such as regarding IRAs. Although the issues of high advisory fees and conflicts of interest have generated extensive controversy about the role and incentives of professional advisors, research has

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18. We draw upon the concept of dominated funds developed in Ian Ayres & Quinn Curtis, Beyond Diversification: The Pervasive Problem of Excessive Fees and “Dominated Funds” in 401(k) Plans, 124 YALE L.J. 1346 (2015) (explaining the concept of dominated funds in 401(k) plans). Ayres and Curtis define dominated funds as “choices in the plan menu that have an optimal portfolio weight of less than 1% and that are more than fifty basis points more expensive than either (i) funds in the same style offered in the menu or (ii) an average of similarly styled funds in the marketplace.” Id. at 1481. We use a simplified approach to dominated funds here. See infra Part III.B.2.

19. See, e.g., Anne Tergesen, 401(k) Fees, Already Low, Are Heading Lower, WALL STREET J. (May 15, 2016), http://www.wsj.com/articles/401-k-fees-already-low-are-heading-lower-1463304601 [https://perma.cc/D82Y-L5MM] (reporting that “[a]ccording to Vanguard Group, investors in a plan that charged 0.25% a year could in theory amass 20% more money over a four-decade career than they could in one that charged 1.25%, all else being equal”).


21. See COUNCIL OF ECON. ADVISORS, EXEC. OFFICE OF THE PRESIDENT, THE EFFECTS OF CONFLICTED INVESTMENT ADVICE ON RETIREMENT SAVINGS (2015) (explaining that “advisers’ conflicts of interest are quantitatively significant and erode households’ retirement assets by billions of dollars each year”).
not addressed the threshold question—whether investment professionals can in fact improve the quality of retirement planning.

In this Article, we address the capacity of professional advisors to mitigate the problem of poor financial literacy. With the assistance of the Financial Industry Regulatory Association (FINRA),22 we enlisted a group of professional advisors to participate in our study. Our results document a predictable but nonetheless dramatic knowledge gap between professionals and ordinary investors at a basic level of understanding. The professional advisors were overwhelmingly more financially literate than even the more literate ordinary investors. Similarly, the professional advisors performed better across a variety of dimensions at the task of choosing among investment alternatives.

The reasons the professional advisors performed better are particularly important. Professional advisors, unlike ordinary investors, recognized that appropriate asset allocation was a key component of retirement investing, understood the importance of allocating money to equities over a long-term investment horizon, and, to a large degree, correctly identified and rejected inferior investment options.

Our results identify a potential value of professional advice in mitigating the effects of financial illiteracy in retirement planning. As a result, our study has important implications for regulation of retirement investing and, in particular, the DOL’s 2016 fiduciary rule.23 Our findings suggest the need for regulators to be sensitive to the knowledge gap in weighing the costs of heightened regulation against the value of reducing possible conflicts of interest.

The Article proceeds in four Parts. Part I provides a brief overview of the background literature on financial literacy and the regulatory context to which our study is directed. Part II describes our study’s structure and the construct of our financial literacy index. Part III reports our findings about the role of financial literacy in investor decisionmaking. Part IV considers the implications of our findings and documents the potential value to retail investors of receiving access to professional investment advice.


I. BACKGROUND

A. The Role of Financial Literacy

An extensive body of research reports that consumers lack basic financial literacy. At the outset, as scholars concede, this observation is overly simplistic in that financial literacy can be defined in various ways. As one paper has observed, many definitions incorporate both knowledge of financial concepts and the skills necessary to apply that knowledge to the task at hand. Evaluating financial literacy may also be context specific: the necessary skills and knowledge vary according to the task. This Article examines financial literacy in the context of investment decisionmaking, and in particular its role in retirement planning.

Annamaria Lusardi and Olivia Mitchell have conducted the most extensive and best-known research on financial literacy. Most of their work uses a financial literacy assessment instrument consisting of three questions. The questions are:

• Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow: [more than $102, exactly $102, less than $102? Do not know; refuse to answer].
• Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy: [more than, exactly the same as, or less than today with the money in this account? Do not know; refuse to answer].
• Do you think that the following statement is true or false? “Buying a single company stock usually provides a safer return than a stock mutual fund.” [True, false, do not know; refuse to answer].
in the United States and throughout the world. \textsuperscript{28} Their bottom-line conclusion is that “financial literacy can play a key role on both saving and portfolio choice.” \textsuperscript{29}

The Lusardi and Mitchell test has been highly influential. They and other scholars added to the three basic questions in some cases. \textsuperscript{30} Other scholars have introduced their own measures of financial literacy. \textsuperscript{31} A common finding among the extensive literature is that levels of financial literacy are low. \textsuperscript{32}

Commentators cite research linking low financial literacy to a wide variety of costly financial mistakes, including the failure to save adequately, the use of expensive sources of credit, and the failure to obtain and use information about various financial products. \textsuperscript{33} For example, Lusardi and Mitchell found that women who exhibit lower

\begin{itemize}
  \item \textsuperscript{28} Lusardi & Mitchell, \textit{Economic Importance}, supra note 25, at 10 (describing the use of these three questions in various surveys).
  \item \textsuperscript{29} Lusardi & Mitchell, \textit{Financial Literacy and Planning}, supra note 27, at 35.
  \item \textsuperscript{32} See, e.g., Lusardi & Mitchell, \textit{Financial Literacy and Planning}, supra note 27, at 34 (reporting “widespread financial illiteracy among older Americans”).
\end{itemize}
levels of financial literacy are less likely to plan for retirement. Behrman and others found that financial literacy was positively correlated with household wealth and that the effects of literacy were “more important than schooling for explaining variation in household wealth and pension contributions.” Van Rooij, Lusardi, and Alessie found those with lower levels of financial literacy are less likely to invest in stocks.

Regulators have also researched financial literacy. FINRA’s Investor Education Foundation attempted to measure financial literacy through a five-question study—the National Financial Capability Study—which is simply the Lusardi five-question survey. Of the five multiple-choice questions, which address compounding, inflation, mortgages, diversification, and the relationship between interest rates and bond prices, FINRA’s subjects answered an average of 2.88 questions correctly. From these results, FINRA concluded, “Americans demonstrate relatively low levels of financial literacy and have difficulty applying financial decisionmaking skills to real life situations.”

The Dodd-Frank Act directed the Securities and Exchange Commission (SEC) to examine investor financial literacy, and the SEC reported its results in a report in 2012. The report relied upon a review of existing quantitative studies of financial literacy conducted by the Library of Congress as well as online testing of investor understanding of various SEC-mandated disclosure documents.

34. Lusardi & Mitchell, How Do Women Fare?, supra note 27, at 415–16.
35. Behrman et al., supra note 30, at 303.
36. van Rooij et al., Stock Market Participation, supra note 30, at 450.
41. Id. § 917.
43. Id. at vii.
44. Id. at ix.
SEC, like FINRA, concluded, “American investors lack basic financial literacy.”

Scholars and policymakers are attempting to respond to evidence of poor consumer investment decisions by improving consumer financial education. For example, the Consumer Financial Protection Bureau (CFPB) has identified as one of its objectives developing tools for more effective investor education. Similarly, on June 25, 2013, President Obama signed an executive order establishing the President’s Advisory Council on Financial Capability for Young Americans. The Council, led by the U.S. Treasury Department, evaluates the financial capability of young people and develops tools to improve their capabilities. The Schwab Foundation, under the leadership of Carrie Schwab-Pomerantz, has worked to develop investor-education programs for more than thirty years. As Schwab-Pomerantz explains: “[F]inancial education can change lives.”

For investor education to improve financial decisionmaking, however, two things must be true. First, a lack of financial literacy must be a contributing cause of poor investor decisions. Second, investor education must be effective in improving financial literacy. This Article focuses primarily on the first question; our future work will focus on the second.
B. Financial Literacy, Regulation, and Retirement Investing

The role of financial literacy is particularly important in the context of retirement savings. Over the past forty years, retirement-savings plans have shifted almost entirely from employer-directed plans to those in which individual workers make their own savings and investment decisions. This shift has resulted in many workers lacking sufficient savings at the time of retirement. Critics attribute the problem, in part, to poor decisions by plan participants and by those employees who choose not to participate at all. Studies suggest that participants in workplace retirement plans make numerous mistakes, including saving too little, choosing suboptimal investment options, and paying excessive fees. Understanding the contribution of financial literacy to poor investment decisions is critical to the policy choices around whether and how to regulate.

The Employee Retirement Income Security Act of 1974 (ERISA) regulates most employee benefit plans, including employer-provided retirement plans. ERISA’s mandates are implemented primarily by
Regulation of retirement investing reflects a tension between two policy objectives. On the one hand, the DOL has attempted to address deficiencies in the structure of retirement plans and in employee use of such plans by imposing mandatory requirements on plans and plan providers. On the other hand, wary perhaps of the pitfalls of mandating a specific retirement strategy or product, the regulations privilege investor autonomy.

The law recognizes the critical role that employers and other intermediaries play in retirement investing. Specifically, ERISA is structured around the concept of a fiduciary. Under ERISA, a person becomes a fiduciary by giving investment advice, exercising discretionary authority over the management of a retirement plan, exercising control over plan assets, or having discretionary authority over a plan’s administration. A person can also become a fiduciary by providing investment advice for a fee.

Under ERISA, fiduciaries are subject to strict regulation, including mandated legal obligations, transaction restrictions, and liability exposure. Employers who might otherwise be subject to this


61. For example, employers have obligations to construct plans consisting of an appropriate mix of investment alternatives, to administer the plan properly, to make a variety of disclosures, including disclosure of fee information, and to avoid conflicts of interest. See, e.g., LaRue v. DeWolff, Boberg & Assocs., 552 U.S. 248, 256 (2008) (recognizing potential employer liability for “fiduciary breaches that impair the value of plan assets in a participant’s individual account”); Tussey v. ABB, Inc., 746 F.3d 327, 336 (8th Cir. 2014) (imposing liability on plan fiduciaries for allowing the plan to pay excessive recordkeeping fees); Scott Mayland, Note, Ratcheting Up the Duty: The Department of Labor’s Misguided Attempt to Impose a Paternalistic Model upon Defined Contribution Plans Through ERISA, 75 OHIO ST. L.J. 645, 646 (2014) (criticizing the paternalism imposed through DOL’s fiduciary duty approach). See generally Anne Tucker, Retirement Revolution: Unmitigated Risks in the Defined Contribution Society, 51 HOUS. L. REV. 153 (2013) (describing employer obligations under ERISA).

62. See, e.g., Dana M. Muir, Choice Architecture and the Locus of Fiduciary Obligation in Defined Contribution Plans, 99 IOWA L. REV. 1, 14–16 (2013) (explaining how both the decision to participate and the choice among investment alternatives have been regarded as employee decisions by both regulators and commentators); see also Fisch & Wilkinson-Ryan, supra note 1, at 618 (observing that courts have frequently accepted alleged deficiencies among investment options so long as plan offered participants a sufficient number of alternatives).

63. See Medill, supra note 60, at 27 (“ERISA’s statutory scheme is built around the concept of a ‘fiduciary.’”).


65. Id. § 1002(21)(A)(ii).

66. Among other things, ERISA prohibits fiduciaries from all conflicts of interest absent an explicit exemption. ERISA § 404(a)(1), 29 U.S.C. § 1104(a)(1). This standard has come to be
standard can limit the scope of their fiduciary obligations, however, if
they delegate investment responsibility to plan participants in
accordance with the DOL’s requirements. Specifically, an employer
is relieved of fiduciary responsibility for investment losses experienced
by its employees if the plan participants exercise independent control
over their investment decisions.

Notably, the 404(c) regulations do not limit the employer’s
obligation to construct an appropriate plan. In Tibble, the Supreme
Court held that ERISA fiduciaries have a continuing duty to monitor
the quality of the investment options offered in their 401(k) plans and
must remove imprudent options from the plan. Although the decision
was narrow and did not specify the scope of this monitoring function,
it focused increased attention on the important role played by plan
fiduciaries.

ERISA permits employers and other advisors to provide investor
education but draws a strict distinction between education and
investment advice: provision of the latter subjects the provider to
fiduciary obligations. The line between the two is unclear. Previously,
ERISA created a substantial risk that investor education would be
treated as the provision of investment advice and subject employers to
fiduciary obligations, leading employers to refrain from any effort to
educate plan participants. The Pension Protection Act of 2006

known as ERISA’s exclusive benefit rule. See Daniel Fischel & John H. Langbein, ERISA’s

67. DOL regulations provide that in a plan that “provides for individual accounts and
permits a participant . . . to exercise control over the assets in his account, if a
participant . . . exercises control over the assets . . . no person who is otherwise a fiduciary shall
be liable under this part for any loss . . . which results from such participant’s . . . exercise of
control.” See 29 C.F.R. § 2550.404c-1 (2015). These provisions are known as the 404(c)
regulations. To qualify for this protection, the plan must provide that the employees exercise
control, have sufficient information to make informed investment decisions, and have access to
“a broad range of investment alternatives.” Id. Employers, however, are treated as fiduciaries if
they provide their employees with investment advice. 29 U.S.C. § 1002(21)(A)(ii).


70. Blaine F. Aikin, Ramifications of Supreme Court Decision on 401(k) Fee Lawsuit Run
Deep, INV. NEWS: FIDUCIARY CORNER (June 1, 2015, 10:43 AM),
http://www.investmentnews.com/article/20150601/FREE/150609998/ramifications-of-supreme-
court-decision-on-401-k-fee-lawsuit-run-deep [https://perma.cc/NDH7-W3UQ].

71. See Mayland, supra note 61, at 670 (explaining that, even after the PPA, “the line
between the provision of advice and education is still not clear”).

72. See, e.g., Medill, supra note 60, at 46 (explaining employer reluctance to provide investor
education as a product of DOL policy); Dana M. Muir, The Dichotomy Between Investment
Advice and Investment Education: Is No Advice Really the Best Advice?, 23 BERKELEY J. EMP. &
responded to this problem by creating an explicit exemption designed to encourage educational programs. Some commentators have argued that the statute should go further and impose an affirmative obligation on employers to provide investor education. Employees would likely be receptive: one recent study reported, “89 percent of employees want their employer to make personal financial planning advice available.”

On April 6, 2016, the DOL released its long-awaited fiduciary rule. The rule was adopted in response to ongoing criticism of the high cost of conflicts of interest by those who provide investment advice in connection with retirement plans. It responds by heightening the

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74. See, e.g., Jefferson, supra note 73, at 483–44 (proposing a mandatory education requirement for all employers that sponsor 401(k) plans).


77. In February 2015, the White House Council of Economic Advisers released an analysis reporting that conflicted advice from brokers costs investors $17 billion per year. COUNCIL OF ECON. ADVISERS, THE EFFECTS OF CONFLICTED INVESTMENT ADVICE ON RETIREMENT SAVINGS 26 (2015), https://www.whitehouse.gov/sites/default/files/docs/cea_coi_report_final.pdf [https://perma.cc/HFM7-NWVD]. President Obama responded by calling upon the DOL to move forward with a rulemaking proposal that would heighten the regulatory restrictions imposed on brokers who provide advice in connection with retirement investing, citing the need for retirement advisors to “put the best interests of their clients above their own financial interests.” U.S. DEP’T OF LABOR, FACT SHEET: DEPARTMENT OF LABOR PROPOSES RULE TO ADDRESS CONFLICTS OF INTEREST IN RETIREMENT ADVICE, SAVING MIDDLE-CLASS FAMILIES BILLIONS OF DOLLARS EVERY YEAR, http://
regulatory obligations of those advisors. 78 The rule classifies anyone who provides investment advice for a fee in connection with a retirement plan as a fiduciary. As a fiduciary, an advisor must meet designated compliance requirements and is prohibited from engaging in specified transactions or using designated fee structures. 79 Although the final rule has been described as substantially “watered down” from a prior proposal that had been heavily criticized, 80 the new regulatory requirements will increase the cost of professional advice by making compliance more burdensome and imposing greater liability risk. This increased cost may, in turn, reduce access by ordinary investors to professional advice in connection with retirement planning. 81

Critics expressed particular concern about the potential effect of the fiduciary rule on the provision of investor education. The DOL designed its response to protect employers that offer investor education programs. In addition to containing an extensive discussion of investor education—which, pursuant to the rule, does not constitute


79. Advisors can engage in certain prohibited transactions if they comply with the requirements of the Best Interest Contract Exemption. 29 C.F.R. § 2550 (2015).


the provision of investment advice—the DOL adopting release explains, “[T]he fact that employers do not generally receive compensation in connection with their educational communications provides employers with a high level of confidence that their educational activities would not constitute investment advice under the rule.”

Despite the carve-out for investor education, the fiduciary rule will increase the costs of providing investment advice in connection with retirement plans. The effect of reduced access on ordinary investors and their ability to make appropriate investment decisions is unclear. As one report shows, the majority of retail investors seek professional advice for savings plans. There is also evidence that individuals with access to a financial advisor are better long-term investors. There are many reasons for this, but one possibility is that professional advice bridges the knowledge gap between ordinary investors and professional advisors. This Article explores this knowledge gap.

II. STUDY DESIGN AND FINANCIAL LITERACY INDEX

A. Study Participants

We conducted our study with two separate groups. Our first group consisted of people who signed up through Amazon Mechanical Turk (MTurk) to participate in internet-based research for compensation. In all, 146 MTurk subjects participated in the study. We report demographic information on the full group in Table 1.

82. 29 C.F.R. § 2510.3–21(b)(iv) (2015).
84. WYMAN, INC., supra note 20, at 6.
86. See Fisch & Wilkinson-Ryan, supra note 1, at 631–32 (describing MTurk).
87. We began with an MTurk “HIT” requesting 150 participants. In Qualtrics, our survey software, we received 150 fully completed surveys and 22 partially completed surveys. We removed the data for completed surveys that did not match a submitted MTurk HIT ID, partially completed surveys, and completed surveys that had an ID or IP address that matched a partially completed survey, which resulted in our final count of 146 participants. All participant data removals were chosen based only on this information and completed before and independent of any data analysis.
Table 1. MTurk Respondents’ Demographic Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>58%</td>
</tr>
<tr>
<td>Median Age</td>
<td>33</td>
</tr>
<tr>
<td>Four Year College Degree or More</td>
<td>55%</td>
</tr>
<tr>
<td>Employed Full or Part Time</td>
<td>66%</td>
</tr>
<tr>
<td>Annual Household Income &lt;$50,000</td>
<td>55%</td>
</tr>
</tbody>
</table>

Our second group consisted of professional advisors. With the cooperation of FINRA, we made our survey available to employees of FINRA firms on a voluntary basis. The survey was accessible through the FINRA compliance website via a link labeled “Participate–Wharton Investment Strategies Study.”

We received responses from sixty professional advisors.88 Each of these advisors was either a registered investment advisor, a registered representative (broker), or both. We report demographic information on the professional advisors in Table 2 below.

Table 2. FINRA Respondents’ Demographic Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>79%</td>
</tr>
<tr>
<td>Median Age</td>
<td>46</td>
</tr>
<tr>
<td>Four Year College Degree or More</td>
<td>96%</td>
</tr>
<tr>
<td>Median Time on Survey</td>
<td>23 minutes</td>
</tr>
<tr>
<td>Median Number Funds Invested In</td>
<td>4</td>
</tr>
</tbody>
</table>

Although we attempted to make the MTurk and professional-advisor tasks as similar as possible, there are multiple reasons these groups are not directly comparable. They received the survey at slightly different times.89 The instructions were about giving advice to a hypothetical client (the advisors) instead of about how to make personal allocations (the MTurk subjects). Most of the individuals who accessed the survey via MTurk completed the survey, whereas many advisors only looked at the survey instructions or completed the allocation without finishing the task.90 Thus, the advisors who did

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88. We included all survey responses that were fully completed. We did not include eighty-two additional surveys were only partially completed. (Twenty-two of these completed the allocation, but not the following questionnaire. The remainder did not complete even the allocation.)

89. The advisor responses were gathered between February and September of 2015. The MTurk responses were gathered in November of 2015.

90. See supra note 88.
complete the survey may be especially interested in volunteering to perform this kind of task. Despite these differences, we still believe this study provides insight by making cautious comparisons about how the two groups approach the task of retirement investing, their choices, and their knowledge levels. Nonetheless, we offer these cautious comparisons between the groups in order to suggest the effect of knowledge and expertise on investment strategies.

B. Study Design

We examined financial literacy in the context of a specific investment decision—choosing investments in a 401(k) plan. Drawing upon our prior work, we constructed a web-based interface that allowed subjects to allocate a hypothetical ten thousand dollars among ten investment options as part of a 401(k) plan. The MTurk subjects were told to assume that they were not going to retire for at least thirty years and that an algorithm would simulate their portfolio's value at the end of thirty years based on their investment choices. They were incentivized to maximize the value of their portfolio by being told that at the end of the study they would be paid a percentage of their portfolio’s value at year thirty.

For the professional advisors, we slightly revised the study instructions to ask the subjects to allocate ten thousand dollars on behalf of a hypothetical single client thirty years old, with no children, a lower-middle-class income, and no substantial outside savings or investments. The professional advisors were not paid for completing the study. They saw the portfolio’s total value at the end of thirty years on the final page of the survey.

We offered the subjects ten investment options that included a bank savings account, a money market fund, and eight domestic mutual funds (a target-date fund, two fixed-income funds, two equity index funds, and three actively managed equity funds). Each of the options was modeled upon a real-world example. We provided our subjects with an allocation page that contained a list of all ten funds and their fund category.

The study offered the subjects the opportunity to obtain more detailed information by user-initiated clicking through a series of links. Clicking on a fund name provided the subject with a brief description of the fund and four additional links labeled performance, holdings, risk, and fees, as shown in Figure 1 below. Clicking any of the four links revealed simplified fund-specific information derived from the
attributes of the real-world analog on which the fund was based. The click-through structure allowed us to track the precise information accessed by each subject.

Figure 1.

After our subjects completed the allocation exercise, we asked them to answer a series of questions to assess their attitudes about investing, their objectives while completing their allocation, their financial literacy, and to collect demographic information.\textsuperscript{91} The MTurk subjects and professional advisors were given the same investment alternatives and asked to answer the same questionnaire following their allocation decision.\textsuperscript{92}

At the end of the questionnaire we calculated a predicted value of the selected portfolio.\textsuperscript{93} To simulate the performance of each of the investment options, we used a predetermined algorithm that relied on basic assumptions about the long-term return for each asset class and adjusted those returns to reflect the quoted fees of each of the options in our menu.\textsuperscript{94} The value of a subject’s portfolio was heavily influenced

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\textsuperscript{91} We describe the financial literacy analysis in more detail below.

\textsuperscript{92} We asked the subject pools slightly different employment questions. We asked the professional advisors for information about their current role and their time in the financial industry, whereas we asked the MTurk subjects about their employment status.

\textsuperscript{93} The value of a subject’s portfolio was only disclosed to that subject after the subject completed the study. Professional advisors saw the value on the final page of the survey they completed; the MTurk subjects saw the value at the conclusion of the full study.

\textsuperscript{94} Our algorithm calculated returns according to asset class and provided similar returns for all funds within a single asset class, based on the theory that, over time, a fund is likely to revert to the market rate of return. We then adjusted each fund’s return to reflect the disclosed fee, so that funds with higher fees yielded lower returns. Our algorithm provided subjects with higher payouts for choosing equity over fixed income (the equity risk premium) and with higher payouts for choosing funds with lower fees. See, e.g., Paul A. Merriman, \textit{The Best Investment Advice Ever}, MARKETWATCH (Nov. 5, 2014, 1:13 PM), http://www.marketwatch.com/story/the-best-investment-advice-ever-2014-06-11 [https://perma.cc/2BQ5-WUKN] (discussing the equity
by the subject’s investment decisions. A portfolio that was invested 100 percent in the FDIC-insured bank account would have had a value of $13,478.49 at the end of the thirty-year period. A portfolio that was invested 100 percent in our low-cost equity index fund would have had a value of $132,676.78. Accordingly, our subjects’ investment choices determined the value of their portfolios, and (for the MTurk subjects) their own incentive payment, and the difference between the worst choice and the best was an order of magnitude.

We evaluated our subjects’ performance in the allocation exercise in several different ways as described below. Significantly, we were interested in a number of aspects of the decisionmaking process, including the information accessed by our subjects, their ability to compare alternative investment options, and their effort to minimize fees.

Financial literacy is not, of course, the only factor that is likely to influence the quality of a subject’s investment decisions. To address the role of other factors, we collected demographic data as well as information on education, income, and investment experience. Prompted by findings from our earlier work, we also considered the role of risk tolerance.95 Policymakers and the media have highlighted the billions of dollars of “lost returns” investors sacrifice by paying excessive fees, but because higher equity exposure is associated with increased returns,96 those losses are potentially dwarfed by the revenue sacrificed by excessive risk aversion.

Although economists often treat risk preferences as stable, we hypothesize that retail investors may be limited in their ability to evaluate risk and that increased financial literacy or professional advice may play a role in increasing investor risk tolerance. We therefore explore the role of risk tolerance independently by asking subjects to

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95. See Fisch & Wilkinson-Ryan, supra note 1, at 645 (observing that results from an earlier study suggested that study participants had a poor understanding of the objectives behind retirement investing).

answer a question about the extent to which minimizing risk was a high priority.

C. The Financial Literacy Index

We measured financial literacy in several ways. We developed a series of nineteen questions about financial knowledge, based on refinements from a fifteen-question index that we tested in a prior MTurk study. Our questions explore the difference and attributes of stocks, bonds, and mutual funds as well as the expected long-term performance of equity and fixed income and the meaning of diversification. The questions varied in complexity and were designed to test financial knowledge that is specific to the asset-allocation decision.

We also included four questions that tested subject numeracy. Finally, we included the three questions used by Lusardi and Mitchell to test financial literacy. We report the responses to the financial literacy questions in Table 3 below.


98. To evaluate the reliability of our nineteen-question scale, we calculated Cronbach’s Alpha. Cronbach’s Alpha calculates the correlation of items in a survey and is one measure of the survey’s reliability. See L.J. Cronbach, Coefficient Alpha and the Internal Structure of Tests, 16 Psychometrika 297, 297 (1951) (developing and defending Cronbach’s alpha as a measure of reliability). For the nineteen-point scale, Cronbach’s alpha is 0.72, which is in the range of what is considered reliable. See, e.g., Mohsen Tavakol & Reg Dennick, Making Sense of Cronbach’s Alpha, 2 Int’l J. Med. Educ. 53, 54 (2011) (noting that different reports suggest an acceptable value of Cronbach’s alpha is between .70 and .95).

99. We test numeracy using four questions about the effect of compounding and incorporating increasing degrees of complexity.
Table 3. Quiz Performance, by Item, for Each Subject Pool

<table>
<thead>
<tr>
<th>Question</th>
<th>MTurk Percent Correct</th>
<th>FINRA Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC1: Best returns from stocks</td>
<td>63%</td>
<td>98%</td>
</tr>
<tr>
<td>MC2: Stock = own part of company</td>
<td>89%</td>
<td>98%</td>
</tr>
<tr>
<td>MC3: Bond = lend money to company</td>
<td>80%</td>
<td>98%</td>
</tr>
<tr>
<td>MC4: Safest bond is treasury</td>
<td>87%</td>
<td>100%</td>
</tr>
<tr>
<td>MC5: Interest rates go up, bond prices go down</td>
<td>52%</td>
<td>100%</td>
</tr>
<tr>
<td>MC6: Mutual funds pool with other investors</td>
<td>73%</td>
<td>100%</td>
</tr>
<tr>
<td>MC7: Fund balanced for retirement fund is target-date fund</td>
<td>53%</td>
<td>100%</td>
</tr>
<tr>
<td>MC8: Relationship between risk and returns in long run is positive</td>
<td>48%</td>
<td>73%</td>
</tr>
<tr>
<td>MC9: Longer time horizon, take on more risk</td>
<td>69%</td>
<td>100%</td>
</tr>
<tr>
<td>TF10: Index fund tracks market index</td>
<td>90%</td>
<td>98%</td>
</tr>
<tr>
<td>TF11: Possible to lose money in bond</td>
<td>61%</td>
<td>100%</td>
</tr>
<tr>
<td>TF12: Professional managed funds do better</td>
<td>31%</td>
<td>70%</td>
</tr>
<tr>
<td>TF13: Index funds vary based on manager experience</td>
<td>35%</td>
<td>68%</td>
</tr>
<tr>
<td>TF14: Possible to lose money in mutual fund</td>
<td>89%</td>
<td>100%</td>
</tr>
<tr>
<td>TF15: Expenses do not vary among mutual funds</td>
<td>78%</td>
<td>98%</td>
</tr>
<tr>
<td>TF16: Diversification reduces variability</td>
<td>44%</td>
<td>67%</td>
</tr>
<tr>
<td>TF17: Difference between bank and money market is FDIC insurance</td>
<td>74%</td>
<td>82%</td>
</tr>
<tr>
<td>TF18: Mutual funds less diversified than individual stocks</td>
<td>78%</td>
<td>97%</td>
</tr>
<tr>
<td>TF19: Target dates cheaper than individual funds</td>
<td>30%</td>
<td>46%</td>
</tr>
<tr>
<td>N1: Return in 2 years</td>
<td>61%</td>
<td>78%</td>
</tr>
<tr>
<td>N2: Return in 30 years</td>
<td>38%</td>
<td>75%</td>
</tr>
<tr>
<td>N3: Fees paid in 30 years</td>
<td>42%</td>
<td>50%</td>
</tr>
<tr>
<td>N4: Fees paid in 30 years</td>
<td>35%</td>
<td>42%</td>
</tr>
<tr>
<td>LM1: Compounding</td>
<td>90%</td>
<td>98%</td>
</tr>
<tr>
<td>LM2: Inflation and Savings</td>
<td>84%</td>
<td>98%</td>
</tr>
<tr>
<td>LM3: Safety of Stocks vs. Mutual Funds</td>
<td>80%</td>
<td>96%</td>
</tr>
<tr>
<td>Mean 19-point score</td>
<td>12.3</td>
<td>16.9</td>
</tr>
<tr>
<td>Mean Numeracy Score</td>
<td>1.8</td>
<td>2.4</td>
</tr>
<tr>
<td>Mean LM score</td>
<td>2.5</td>
<td>2.9</td>
</tr>
</tbody>
</table>

As expected, the table indicates that on every measure the professional advisors are more financially literate than the MTurk subjects. We found relatively little variance in the level of financial literacy among the professional advisors. Across the board, our professional subjects answered virtually all of the financial literacy questions accurately, generating a correct response rate of about 90 percent, as opposed to the MTurk subjects who answered correctly only about 65 percent of the time on a true–false and multiple-choice test. All but one of the professional advisors scored fourteen or higher on the nineteen-question scale. Only three of our sixty professional advisors got any of the Lusardi and Mitchell questions wrong. We turn, in the next Part, to exploring the implications of that knowledge gap by examining the relationship between financial literacy and investment performance.

III. STUDY RESULTS

A. Financial Literacy and Investment Performance

Our first objective was to evaluate the role of financial literacy in investment performance. To analyze the effect of financial literacy, we divided the MTurk sample into two groups—high- and low-literacy subjects—based on their performance on our nineteen-point literacy scale. The dividing line was at the median score of thirteen. Subjects with a financial literacy score of less than thirteen were categorized as low literacy and those getting thirteen or more items correct were categorized as high literacy. Table 4 provides more detail on the two groups. Note that the median literacy level in the high-literacy MTurk group equaled the bottom score (except for one outlier) of the entire professional-advisor subject pool:

<table>
<thead>
<tr>
<th>Table 4. MTurk Financial Literacy by Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min.</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Low-literacy MTurk</td>
</tr>
<tr>
<td>High-literacy MTurk</td>
</tr>
</tbody>
</table>

As noted above, we evaluated our subjects’ performance in the allocation exercise in several different ways. First, because we
instructed our subjects to maximize the size of their hypothetical retirement portfolio, we looked at the degree to which their success was correlated with financial literacy. Because we constructed an algorithm that calculated portfolio value and because that algorithm depended on certain assumptions about asset allocation and return, we were concerned that the constructed portfolio value did not reflect a sufficiently objective measure of decisionmaking quality.

We therefore considered several alternative metrics for evaluating performance. One of these was the amount invested by our subjects in Fund D, the low-cost index fund. Based on the information provided to our subjects, Fund D was designed to dominate the other investment options over every dimension except risk. The study thus captures the viewpoint seemingly reflected by current DOL policy that, for the average investor, the most appropriate equity option is a low-cost passively managed fund.

Much commentary focuses on the role of disclosure in improving investor performance. A persistent question in this literature concerns the degree to which investors search for and use the information that is available to them. To address this concern, our study design requires our subjects to click on a link to access each specific piece of information about the investment alternatives. The web interface enabled us to track every piece of information that a subject accessed. Because subjects could only identify relevant fund characteristics by clicking on the links, we treat the number of clicks as another outcome variable, reasoning that only investors who obtained the information that was provided could distinguish among the

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100. We consider in more detail below our subjects’ choice among the ten investment alternatives.
101. We consider risk separately, as discussed below.
103. See, e.g., Business and Financial Disclosure Required by Regulation S–K, 81 Fed. Reg. 23,916, 23,917 (Apr. 22, 2016) (soliciting input on whether the existing disclosures mandated by Regulation S–K “continue to provide the information that investors need to make informed investment and voting decisions”).
investment alternatives. A similar proxy is provided by the amount of
time our subjects spent on the exercise. A noisy variable, both because
our subjects could have been doing other things during the survey and because, for the MTurk subjects, the MTurk structure included a time limit after which the study expired, preventing subjects who spent too long from completing the survey.

Table 5 reports the differences among subject groups. Financial
literacy was highly associated with performance. The high-literacy
MTurk subjects selected portfolios that were worth an average of
$21,000 more than the low-literacy MTurk subjects. Similarly, the
professional advisors generated portfolios worth an average of 20
percent more than those of the MTurk subjects, a difference that
translates into an average of more than $16,000 on a $10,000 initial
investment. Most starkly, the professional advisors selected portfolios
that were worth about $27,000 more than the low-literacy MTurk
subjects, a difference of 33 percent.

<table>
<thead>
<tr>
<th>Table 5. Outcome Variables by Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Literacy</td>
</tr>
<tr>
<td>Returns</td>
</tr>
<tr>
<td>t=5.94, df=142.5, p&lt;.001</td>
</tr>
<tr>
<td>Cheap Index Fund</td>
</tr>
<tr>
<td>Investment</td>
</tr>
<tr>
<td>Fees Paid108</td>
</tr>
<tr>
<td>t=3.09, df=104.7, p=0.003</td>
</tr>
<tr>
<td>Total Clicks</td>
</tr>
<tr>
<td>t=2.97, df=139, p=0.004</td>
</tr>
</tbody>
</table>

Financial literacy was also associated with our other outcome
variables. The financially literate subjects allocated more money to the
cheap index fund, paid lower fees, and accessed more information in
connection with the allocation decision as measured by number of

105. Because of design limitations in the survey format, time is a noisy variable, both because
our subjects could have been doing other things during the survey and because, for the MTurk
subjects, the MTurk structure included a time limit after which the study expired, preventing
subjects who spent too long from completing the survey.


107. Because our study did not charge a fee for the bank account, it was possible to minimize
fees by investing exclusively in the bank account.

108. To calculate fees paid, we omitted the cash account.
clicks. Our professional advisors outperformed the high-literacy MTurk subjects along those dimensions as well except for clicks.\textsuperscript{109}

These differences could be explained by factors other than financial literacy. Indeed, an extensive literature looks at the role of various demographic factors as well as experience in predicting investment performance. We explore the role of these factors in two ways. First, we ran a regression to explore the relationship between demographic characteristics and financial literacy. The results are shown in Table 6 below:

\textit{Table 6. Regression: DV=FL Score 19}

<table>
<thead>
<tr>
<th></th>
<th>Experience Score (1)</th>
<th>Demographics (2)</th>
<th>Experience Score and Demographics (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>12.26***</td>
<td>11.44***</td>
<td>11.48***</td>
</tr>
<tr>
<td></td>
<td>(0.21)</td>
<td>(0.33)</td>
<td>(0.32)</td>
</tr>
<tr>
<td>Experience</td>
<td>0.85***</td>
<td>0.64**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.21)</td>
<td>(0.22)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.48*</td>
<td>0.41</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.22)</td>
<td>(0.21)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1.35**</td>
<td>1.3**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.44)</td>
<td>(0.42)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>0.66**</td>
<td>0.56*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.23)</td>
<td>(0.22)</td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>0.09</td>
<td>-0.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.23)</td>
<td>(0.23)</td>
<td></td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.092</td>
<td>0.114</td>
<td>0.158</td>
</tr>
<tr>
<td>F-Test</td>
<td>$F(1,145)=15.83$</td>
<td>$F(4,139)=5.61$</td>
<td>$F(5,138)=6.37$</td>
</tr>
<tr>
<td>p-value</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

n=144. *p<.05, **p<.01, ***p<.001 All noncategorical independent variables have been scaled by subtracting the mean and dividing by the standard deviation.

As Table 6 shows, financial literacy is associated with gender (males are more financially literate) and investment experience, and is somewhat correlated with education. These findings are predictable and consistent with the existing literature.\textsuperscript{110}

\textsuperscript{109} The difference in clicks may be explained by the professional advisors’ greater familiarity with the task.

\textsuperscript{110} See, e.g., Annamaria Lusardi, \textit{What’s Behind the Financial Literacy Gender Gap?}, \textit{WALL STREET J.: THE EXPERTS} (Nov. 2, 2015, 7:00 AM), http://blogs.wsj.com/experts/2015/11/02/whats-
Results from our earlier research suggest the independent importance of risk tolerance in investing behavior. We analyze risk tolerance in this study using a self-reported seven-point scale of agreement with the statement that minimizing risk was an important priority (reverse coded so that a higher number is a higher risk tolerance).

Table 7. Risk and Financial Literacy

<table>
<thead>
<tr>
<th></th>
<th>Low Literacy</th>
<th>High Literacy</th>
<th>Professional Advisors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Risk Tolerance</td>
<td>2.6</td>
<td>3.7</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Overall, the MTurk subjects indicated a lower risk tolerance than the FINRA subjects, and risk tolerance was associated with financial literacy. The two variables are highly correlated ($r=.35$) and the difference on risk score between low- and high-literacy MTurk participants is highly significant ($t=4.1, p=.000$). Risk tolerance was not different between high-literacy subjects and professional advisors.

We refine this analysis by running a basic regression in which our dependent variable is financial performance, measured by portfolio value. We include financial literacy demographic controls, and controls for risk tolerance and the numeracy score.

behind-the-financial-literacy-gender-gap [https://perma.cc/4MUF-9LZ] (reporting study results showing that there is a persistent gender gap in financial literacy).
As Table 8 shows, financial literacy is a strong predictor of better performance on the experimental task as measured in simulated returns on investment, holding the demographic variables constant. In other words, financial literacy is not just a function of gender, investment experience, or risk tolerance. Additionally, although numeracy—the ability to solve math problems related to investing, specifically compounding—is highly correlated with financial literacy,\textsuperscript{111} numeracy is not independently predictive of success in

\textsuperscript{111} As expected, our independent variables are highly correlated with one another. Our financial literacy score is also highly correlated with the LM-literacy score. In unreported regressions, we find that both indices have independent explanatory power. This data is on file with the \textit{Duke Law Journal}.
navigating the investment choices. When other variables are accounted for, numeracy has no relationship to investment decisions. Finally, for the MTurk subjects, risk attitude was one of the most significant predictors of performance even after accounting for financial literacy more generally. Table 8 shows that higher risk tolerance is associated with a significant increase in returns in the investment task even holding financial literacy constant.

We note that the relationship between risk tolerance and investment performance is predictable—the equity risk premium historically has compensated investors for their willingness to bear additional risk. In the context of retirement savings, the effects are compounded. As a result, risk aversion is likely to penalize investors substantially. This finding is consistent with the responses of the professional advisors, who noted that the equity risk premium coupled with the long-term nature of the investment counseled in favor of a substantial exposure to equity.

Generally speaking, the professional advisors had financial literacy scores that were uniformly high with little differentiation or predictive power. We did separately analyze the group we call the “uber-high” respondents, all of whom scored either eighteen or nineteen on the nineteen-point scale. They had marginally significant higher returns by our measure of returns ($t=1.80, p=.081$) and paid noticeably less in fees, averaging fifty basis points rather than sixty-nine ($t=2.69, p=.013$). One advantage of using a more fine-grained financial literacy measure is that it permits us to differentiate meaningfully even within a largely homogenous population.
B. Asset-Allocation Analysis

Table 9 shows the allocation of funds for each subject group.

**Table 9. Asset Allocation, MTurk and FINRA, Means and Medians**

<table>
<thead>
<tr>
<th>Fund (fee)</th>
<th>MTurk Low Literacy</th>
<th>MTurk High Literacy</th>
<th>FINRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>B: Fixed-Income Fund (.89%)</td>
<td>9.8 [8]</td>
<td>4.7 [0]</td>
<td>5.1 [0]</td>
</tr>
<tr>
<td>D: Cheap Index Fund (.17%)</td>
<td>8 [10]</td>
<td>19.3 [10]</td>
<td>27.5 [20]</td>
</tr>
<tr>
<td>H: Managed Fund (.62%) (closet index)</td>
<td>10.4 [10]</td>
<td>11.4 [10]</td>
<td>7 [0]</td>
</tr>
<tr>
<td>I: Money Market (.16%)</td>
<td>12 [5]</td>
<td>3.9 [0]</td>
<td>1.6 [0]</td>
</tr>
<tr>
<td>J: Cash (no fee)</td>
<td>11.1 [9]</td>
<td>3.5 [0]</td>
<td>1.3 [0]</td>
</tr>
</tbody>
</table>

Note: Means are the first number in each cell. Medians are provided in square brackets.

As noted above, one of the challenges in evaluating retirement investing is setting an appropriate benchmark—that is, normatively evaluating a given investment strategy. To limit this concern, our study focuses largely on asset-allocation decisions and on our subjects’ ability to make rational allocation decisions without seeking to identify which choices are necessarily optimal. We consider three aspects of the allocation decision: diversification, investment in dominated funds, and investment in cash and cash equivalents.
1. Diversification. In prior research, we found evidence of naive diversification. Subjects did not appear to “pick [the best] funds” but instead spread their investment across the full range of alternatives. We observed variation in this pattern, however, and flagged the question of what investor characteristics explained naive diversification as a subject for future study. In this project we explored the question in more detail.

As Figures 2–4 demonstrate, our investor groups differed dramatically with respect to the extent to which they engaged in naive diversification. The low-literacy MTurk subjects invested in an average of 7.2 funds, and fully 44 percent of them invested in all ten funds. At the extreme, twenty-one of the MTurk subjects invested 10 percent of their portfolio in each of the ten options.

Figure 2. Low-Literacy MTurk Subjects, Percent of Subjects Investing in Each Number of Funds

112. Naive diversification or confused diversification involves using a simple rule of thumb, such as the 1/n heuristic, rather than diversifying in accordance with maximizing a particular utility function. See Shlomo Benartzi & Richard H. Thaler, Naive Diversification Strategies in Defined Contribution Saving Plans, 91 AM. ECON. REV. 79, 79 (2001) (explaining the concept of naive diversification).

113. Fisch & Wilkinson-Ryan, supra note 1, at 636.

114. Id.
The high-literacy MTurk subjects invested in far fewer funds as shown in Figure 3. The average number of funds they invested in was 4.8, and only 15 percent invested in all ten fund options.

Figure 3. High-Literacy MTurk Subjects, Percent of Subjects Investing in Each Number of Funds

The professional advisors were even more selective as shown in Figure 4. They invested in an average of 4.3 funds, and only 5 percent (three subjects) invested in all ten funds. Not one of the professional advisors engaged in the 1/10 investment strategy of allocating 10 percent of their portfolio to each of the ten investment options. All these differences are highly significant.
Unlike the MTurk subjects, the professional advisors appeared to recognize that the allocation task involved evaluating the relative merits of the allocation options. Several of the professional advisors specifically identified the duplication among the fund options and made a clear decision to choose the better among similar alternatives.\(^{115}\) As discussed below, our fund menu in this study contained dominated funds that investors should have rejected in favor of alternatives. Accordingly, naive diversification reduced investor returns.

2. Dominated Funds. In their responses, the professional advisors highlighted the importance of asset allocation in retirement planning. Our study was designed, in a simplified way, to test the extent to which subjects were making intelligent asset-allocation choices. The most explicit test of asset allocation was our inclusion of two S&P 500 index funds that were identical in every dimension except fees.\(^{116}\)

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115. As one subject explained: “2 funds seemed enough as F, G & H look the same as do B & C and D & E.” (survey on file with the authors).

116. The reported past performance of the high-cost index fund was also lower, reflecting the cost associated with the higher fee.
We found substantial differences among our investors. Overall, the differences corresponded to financial literacy; 63 percent of the high-literacy MTurk subjects invested nothing in the expensive index fund, but only 27 percent of low-literacy MTurk subjects invested zero. Oddly, 42 percent of FINRA subjects invested some amount of their portfolio in the expensive index fund, perhaps because they were choosing by category rather than cost. Those who invested in the dominated index fund were largely subjects who had not clicked on the fees button at all.

We presented our subjects with two additional dominated funds. One dominated fund was a closet index fund—a fund that purported to be actively managed and charged a corresponding fee—which had holdings and returns that were virtually identical to those of the index funds.117 The other dominated fund was a fixed-income fund that dominated the other fixed-income fund in terms of risk, fees, and past performance, although, because the funds were modeled upon real-world options, the holdings of the two were not identical.

In both cases, the FINRA subjects were better than the MTurk subjects at identifying the dominated funds, although the FINRA subjects did not avoid those funds entirely. Approximately 63 percent of the FINRA subjects invested nothing in the closet index fund, compared to 33 percent of the MTurk subjects. Similarly 44 percent of the MTurk subjects invested nothing in the dominated fixed-income fund, and 67 percent of the FINRA subjects invested zero in that fund.

These findings are only suggestive at this point, because there are multiple possible explanations for failure to invest in any given fund. But the first look does suggest a kind of menu effect that has been identified in work on the subject of choice architecture and that should be of concern to regulators.118 As we discuss further below, the implication of this finding may be a need for enhanced employer obligations with respect to plan design. Specifically, the current regulatory emphasis on maximizing employee choice among

117. See Fisch, supra note 13, at 2018 (explaining closet index funds).

investment alternatives may not provide employees with sufficient protection.

C. Risk Aversion and Equity Allocation

As noted above, we found that risk aversion played a substantial role in explaining differences in the value of our subjects’ portfolios. This result was, in part, a product of the fact that our valuation algorithm reflected a substantial risk premium. Our theory was that, over a thirty-year time horizon, investors are compensated for bearing the risk associated with equities and penalized, in terms of performance, for allocating their investments primarily into cash.\textsuperscript{119} Additionally, because we offered investors a low-cost fixed-income fund option (and a target-date fund), even those investors who sought to minimize the risk of their portfolios had an investment alternative that should have dominated the cash and money market fund options.\textsuperscript{120} Within the framework of this study, we therefore viewed substantial allocations to both the cash and money market alternatives as costly mistakes.

We found a dramatic difference between our subject groups with respect to this allocation choice as shown in Table 10 below.

<table>
<thead>
<tr>
<th>Fund</th>
<th>Low-Literacy MTurk</th>
<th>High-literacy MTurk</th>
<th>Professional Advisors</th>
</tr>
</thead>
<tbody>
<tr>
<td>I: Money Market</td>
<td>12.0</td>
<td>4.0</td>
<td>1.6</td>
</tr>
<tr>
<td>J: Cash</td>
<td>11.1</td>
<td>3.5</td>
<td>1.3</td>
</tr>
</tbody>
</table>

The allocation differences were consistent in our subjects’ understandings of the investment task. We asked all our subjects several open-ended questions designed to capture their intended investment strategy. Our professional-advisor subjects overwhelmingly both considered the allocation of their portfolio between debt and equity as an important consideration and, in considering that allocation, chose to invest the majority of the portfolio in equity—an


\textsuperscript{120.} In the real world, investors might allocate a percentage of their portfolio to cash to take advantage of future buying opportunities. Because investors in our study were not permitted to make adjustments to their portfolios after the initial allocation, this motivation for allocating assets to cash should have been eliminated.
average of 80 percent. In support of this decision, they cited the long time frame over which the money would be invested and the historic equity premium. The high-literacy MTurk subjects provided a similar explanation stating that to maximize growth, a substantial investment in equity was required and that thirty years provided sufficient time to “ride out the storm.” In contrast, the low-literacy MTurk subjects described their investment objective in terms of safety and stability and, significantly, did not even address the applicable time horizon.

The DOL has already shifted its regulatory approach to provide a nudge in favor of increased equity investing by, for example, authorizing employers to provide a target-date fund as a default option. Employers are not, however, compelled to do so; nor are they required to advise investors of the potential returns that they may sacrifice in an effort to minimize the riskiness of their portfolios. Our results highlight the potential cost of this policy as well as the value that may be realized through increasing investor risk tolerance.

IV. IMPLICATIONS

We document the importance of financial literacy in retirement investing—limited financial literacy is associated with poor investment decisionmaking. Importantly, however, we highlight the specific types of mistakes associated with limited financial literacy—low-literacy subjects failed even to review the applicable information about their investment options and, predictably, they engaged in naive diversification, failed to identify dominated funds, paid higher fees, and invested too much in cash and cash equivalents. Higher-literacy subjects, although imperfect, demonstrated far better performance across all these dimensions. Our results support the findings in prior research about the importance of financial literacy and offer reasons to question the viability of participant-directed investing as the primary vehicle for retirement savings. Whether or not investor performance

121. We considered allocations to the target-date fund, which was described as consisting of 95 percent equity at the time of the study, as an allocation to equity.

can be improved through disclosure, investor education, or other responses—a question we do not address in this study—the limitations of investors’ ability to protect themselves offer reasons to question the existing regulatory structure of 401(k) plans. In particular, our findings call into question the viability of relying on investor choice, in that investors may not be capable of making appropriate choices.

One implication of our results is the need to consider more carefully the scope of employer obligations under ERISA. As noted above, under current law, an employer is largely relieved from fiduciary responsibility for an employee’s investment decisions as long as the employer provides a plan that meets a few minimum standards. At the same time, the law has generally viewed plans that offer a broader range of investment options more favorably.123

Consistent with other research, our study shows, however, that the inclusion of inferior options, duplicative options, or simply too many choices may reduce the quality of employees’ decisions.124 Regulators may therefore consider requiring employers to undertake greater efforts to screen the quality of the investment options they offer rather than simply deferring to investor choice, based on the inability of investors to screen for themselves. Although the Supreme Court hinted at the need for greater employer responsibility in Tibble,125 the courts have generally been reluctant to second-guess an employer or plan sponsor’s selection of investment options.126 There are good reasons for this—as noted, the literature does not define the optimal investment strategy or options for retirement investing with precision, and after-the-fact scrutiny is invariably subject to hindsight bias.127 Nonetheless, the performance of both the high-literacy MTurk subjects and the

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123. See, e.g., Ayres & Curtis, supra note 18, at 1493 (“[A] menu that offers at least some good options, like the Hecker menu, will much more likely benefit from the protection of the safe harbor.”); Fisch & Wilkinson-Ryan, supra note 1, at 618–19.
126. See Tussey v. ABB, Inc., 746 F.3d 327, 338 (8th Cir. 2014) (vacating the district court’s finding of liability as reflecting improper “hindsight bias”).
127. See id. (explaining that the plan administrator’s choice of investment options is entitled to deference because “[w]hile it is easy to pick an investment option in retrospect (buy Apple Inc. at $7 a share in December 2000 and short Enron Corp. at $90 a share), selecting an investment beforehand is difficult”).
professional advisors suggests that more rigorous employer screening of fund options can eliminate some potential investor mistakes.\footnote{See Veronika K. Pool, Clemens Sialm, & Irina Stefanescu, \textit{It Pays to Set the Menu: Mutual Fund Investment Options in 401(k) Plans}, 71 J. Fin. 1779, 1781 (2016) (suggesting that 401(k) plan providers are less likely to eliminate underperforming affiliated funds from plan menus and that this behavior affects the returns of plan participants).}

Indeed, an increased focus on this screening function may offer a valuable mechanism for mediating between the DOL’s concern about protecting vulnerable investors and the limitations imposed by the DOL’s strict fiduciary standard. Although the task of identifying the optimal investing strategy may be difficult, the responses by our professional-advisor subjects demonstrate a high degree of consensus about the factors that should inform both retirement-plan design and investor allocation decisions within a retirement plan. It is plausible that these factors could be incorporated into a legal standard, such as that imposed by FINRA’s suitability requirement, that could be imposed without the onerous liability exposure associated with expanded fiduciary status. The goal, after all, need not be the best possible investment decision, but rather reducing avoidable and costly investment mistakes.

Within this goal, we infer an identifiable value associated with professional advice. The professional advisors were uniformly sensitive to the fact that the equity risk premium and the thirty-year time horizon of the allocation decision warranted substantial equity exposure—facts that the low-literacy investors seemed to be unaware of and that were in tension with the risk aversion of that subject group. Although the academic literature commonly views risk aversion as a stable preference,\footnote{See, e.g., Thomas Dohmen, David Huffman, & Jürgen Schupp, \textit{Individual Risk Attitudes: Measurement, Determinants and Behavioral Consequences}, 9 J. Eur. Econ. Ass’n. 522, 524 (2011) (“In economics it is common to think of a single trait as governing risk-taking in all contexts . . . .”).} our study suggests that, at least in the investing context, some degree of risk aversion may, itself, be a mistake.\footnote{This possibility has long been suggested by studies showing greater risk tolerance by the wealthy. For an early example, see Richard A. Cohn, \textit{Individual Investor Risk Aversion and Investment Portfolio Composition}, 30 J. Fin. 605, 618 (1975) (finding “a strong pattern of decreasing relative risk aversion”).} Access to professional advice may address this knowledge gap and enable low-literacy investors to make better retirement investing.
decisions. Our empirical results are consistent with anecdotal evidence of the value of professional advice.\(^{131}\)

This is not to say that the DOL’s concerns about the potential effect of advisors’ conflicts of interest are unfounded; our study design does not allow us to capture the potential effect of conflicts of interest on real-world advice.\(^{132}\) Moreover, even in the absence of problematic fee structures or other incentives, our professional advisors were not infallible: in some cases, their decisions were no better than those of the high-literacy MTurk subjects. Nonetheless, our study highlights the potential value of professional advice in enabling low-literacy investors, those most disadvantaged by a participant-directed model, to make more appropriate allocation decisions. Continued research is necessary to explore the extent to which the benefits from sound retirement investing outweigh the costs associated with professional advice.

CONCLUSION

Participant-directed retirement-savings plans are now the norm, but participants often lack the time and expertise to optimize their investment choices. As a result, investors make costly mistakes. Understanding the obstacles to better investment strategies is critical for the future financial independence of today’s workers.

We have shed light on some of the reasons for poor investor decisionmaking. Primarily, we show that retail investors lack basic financial literacy and that financial literacy is a strong predictor of investment outcomes.

We also document a striking knowledge gap that is reflected in substantial performance differences. Our study demonstrates low-literacy investors make certain types of predictable mistakes that have substantial consequences for investment returns. Employers, through

\(^{131}\) See, e.g., Merriman, supra note 94 (stating that “[e]very DALBAR study that’s been released” suggests that “investors who use professional investment advice achieve higher long-term returns than those who make their own decisions”).

\(^{132}\) The debate about the existence and effect of advisor conflicts of interest is beyond the scope of this Article. Because investors compensate their advisors and, because any compensation structure creates incentives, the real regulatory challenge is to create a compensation structure that most effectively aligns the interests of advisor and investor. See, e.g., Andrew Osterland, Is Your Financial Advisor Really Putting You Before Profit?, CNBC (Sept. 8, 2015, 8:00 AM), http://www.cnbc.com/2015/09/04/is-your-financial-advisor-really-putting-you-before-profit.html [https://perma.cc/YZ9J-VKKZ] (explaining how various common compensation structures can create conflicts of interest).
better plan design, and professional advisors, by encouraging low-literacy investors to increase their risk tolerance, can mitigate some of the mistakes investors commonly make in retirement investing. Professional advice may also reduce investors’ discomfort with the decisionmaking process and lead to higher levels of participation and investment.