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

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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. Studies question the value of efforts to improve these decisions through regulatory reforms or investor education.

This article posits that deficiencies in workplace retirement savings cannot be adequately addressed until the reasons for poor investment decisions are better understood. Our empirical method in this paper centers around a simulated retirement investing task and a lengthy follow-up questionnaire. To analyze the role of financial literacy, we construct a new financial literacy index. Using this measure, we evaluate the role of financial literacy in retirement investment decision-making in a group of non-expert participants. Our results suggest that individual employees are likely to lack the skills necessary to support the current model of participant-directed investing.

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While limited investor financial literacy may be unsurprising, analyzing investor behavior in terms of financial literacy sheds light on why ordinary investors make costly mistakes. We show that financially illiterate participants allocate too little money to equity, engage in naïve 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 at a basic level of understanding. The professional advisors were far better able to answer our financial literacy questions, and performed better at the task of choosing among investment alternatives. The reasons that they performed better are particularly important. Professional advisors, unlike ordinary investors, recognized that appropriate asset allocation was a key component of retirement investing, were sensitive to the importance of allocating money to equities over a long term investment horizon, and, to a large degree, correctly identified and chose superior investment options.

Our results highlight the 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 Department of Labor's new fiduciary rule. 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.

I. 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 saving 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.[1]

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.[2] Yet it is unclear that disclosure is useful to investors who do not understand the task at hand or the material that they are being asked to evaluate. Some commentators have called for greater 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.

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[1] See, e.g., Jodi DeCenzo, Behavioral Finance and Retirement Plan Contributions: How Participants Behave, and Prescriptive Solutions, EBRI Issue Brief No. 301 (2007), at 7, ("Optimal retirement saving and investing are complex tasks that may easily exceed boundaries of rational capability."); Jill Fisch & Tess Wilkinson-Ryan, Why Do Retail Investors make Costly Mistakes? An Experiment on Mutual Fund Choice, 162 U. Pa. L. Rev. 605 (2014).

[2] See, e.g., Troy A. Paredes, Blinded by the Light: Information Overload and its Consequences for Securities Regulation, 81 Wash. U. L. Q. 417, 417-418 (2003) ("A demanding system of mandatory disclosure, which has become more demanding in the aftermath of the Sarbanes-Oxley Act of 2002, makes up the core of the federal securities laws. "). The Department of Labor has also emphasized increased disclosure. See, e.g., U.S. Department of Labor, Final Rule to Improve Transparency of Fees and Expenses to Workers in 401(k)-Type Retirement Plans. Fact sheet. February 2012, http://www.dol.gov/ebsa/pdf/fsparticipantfeerule.pdf.

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.[3] The Department of Labor took a similar approach in adopting its new fiduciary rule, which mandates greater compliance obligations for those who provide investment advice in connection with retirement plans.[4]

Retirement investing presents particular regulatory challenges because the core principles are themselves contested.[5] Commentators do not agree on how much retirement savings is sufficient,[6] an acceptable degree of risk for a retirement portfolio,[7] or the return that workers should expect to earn over the course of their lifetime.[8] Economic fluctuations can change the relative pay-offs of different investment choices, and financial innovation continues to produce new and complex products for investors to evaluate.[9] Scholars debate the effectiveness of market forces in disciplining the fees associated with professional advice.[10] At the same time, a particular employee's needs may be driven by individualized

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[3] 135 S. Ct. 1823 (2015).

[4] U.S. Dept. of Labor, Definition of the Term ''Fiduciary''; Conflict of Interest Rule—Retirement Investment Advice, 29 CFR Parts 2509, 2510, and 2550 (Apr. 6, 2016).

[5] See, e.g., Is There a Case for Actively Managed Funds?, Wall St. J., Mar. 1, 2015 (presenting arguments on both sides of the debate over actively-managed versus index funds).

[6] See, e.g., Tom Anderson, How much do you really need for retirement?, CNBC, Sept. 21, 2015 (relating varying measures of an appropriate retirement savings target).

[7] See. e.g., Josh Cohen, et al., The Great Debate: Should Target Date Fund Glide Paths be managed to or through Retirement, Russell Investments (Apr. 2010) (recounting debate within the investment community about the appropriate asset allocation of target date funds at the target retirement date).

[8] See Carla Fried, That Retirement Calculator May be Lying to You, Bloomberg, Oct. 3, 2011, http://www.bloomberg.com/news/articles/2011-10-03/that-retirement-calculator-may-be-lying-to-you (citing "wide range" of predicated return estimates used in retirement planning).

[9] See, e.g., Jill E. Fisch, Rethinking the Regulation of Securities Intermediaries, 158 U. PA. L. REV. 1961 (2010). (explaining the complexities of target date funds).

[10] See, e.g., Jones v. Harris Assoc. LP, No. 08 -586, Brief of Amicus Curiae Law Professors in support of Petitioner, dated June 15, 2009, 26-27 (citing studies showing lack of market discipline for mutual fund advisory fees); Jones v. Harris Assoc. LP, No. 08 -586, Brief for the Investment Company Institute as Amicus Curiae Supporting Respondent, dated Sept. 2009, 27-28 (citing evidence that mutual fund investors are highly responsive to advisory fees).

factors.[11] 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.[12]

A necessary first step is understanding the process better. Specifically, it is necessary to identify the mistakes ordinary investors are making and the reasons for those mistakes.[13] To analyze these questions, we construct and apply a new financial literacy index, using questions that are 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 decision-making measured across multiple dimensions. Significantly, although age, gender, education, and investing experience are each, respectively, associated with financial literacy, holding constant these demographic variables, financial literacy is highly predictive of investment performance. 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--what an index fund is, what a bond fund is, which investments are associated with higher or lower risk or returns.

By drilling down into the decision-making 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 naïve diversification, fail to identify dominated

[11] Anderson, supra note __.

[12] See, e.g., Dodge & Cox Comment Letter to Department of Labor dated July 17, 2015, at 3 (criticizing the proposed rule for its preference for low cost index funds and observing that "mutual funds with the lowest fees do not necessarily represent the highest quality investments for retirement investors.").

[13] Our work addresses some of the questions raised by our earlier research, which documented costly mistakes made by investors in retirement planning. See Fisch & Wilkinson-Ryan, supra note 1. The study described in this article demonstrates the connection between these mistakes and financial literacy.

funds[14] and are inattentive to fees. These mistakes can be costly.[15] Merely investing $10,000 in an equity fund with a 2% instead of a 1% expense ratio costs will cost an investor a difference of $28,000 over a 30-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 a plan, and they provide advice to retail investors outside the employment context such as by providing advice in connection with IRAs.[16] Although the issues of high advisory fees and conflicts of interest have generated extensive controversy about the role and incentives of professional advisors,[17] research has not addressed the threshold question -- the potential of investment professionals to improve the quality of retirement planning.

We address, in this Article, the capacity of professional advisors to mitigate the problem of poor financial literacy. With the assistance of the Financial Industry Regulatory Association ("FINRA"),[18] 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

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[14] 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).

[15] See, e.g., Anne Tergesen, 401(k) Fees, Already Low, Are Heading Lower, Wall St. J., May 15, 2016, http://www.wsj.com/articles/401-k-fees-already-low-are-heading-lower-1463304601 (reporting that "According 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.").

[16] Oliver Wyman, The Role of Financial Advisors in the US Retirement Market (July 10, 2015).

[17] See Executive Office of the President of the United States, The Effects of Conflicted Investment Advice on Retirement Savings (Feb. 2015) (White House Report) at 22 ("advisers' conflicts of interest are quantitatively significant and erode households' retirement assets by billions of dollars each year").

[18] The Financial Industry Regulatory Authority (FINRA) is a non-governmental self-regulatory organization that oversees the brokerage industry. About FINRA, http://www.finra.org/about (last visited May 2, 2016). As of May 2, 2016, FINRA regulated approximately 3,940 securities firms with approximately 641,155 brokers. Id.

even the better of the ordinary investors. Similarly, the professional advisors performed better, across a variety of dimensions, at the task of choosing among investment alternatives.

The reasons that 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, were sensitive to 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 highlight the 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 Department of Labor's new fiduciary rule. 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 is organized as follows. Part II provides a brief overview of the background literature on financial literacy and the regulatory context to which our study is directed. Part III describes our study structure and the construct of our financial literacy index. Part IV reports our findings about the role of financial literacy in investor decision-making. Part V considers the implications of our findings.

II. Background

A. The Role of Financial Literacy

An extensive body of research reports that consumers lack basic financial literacy.[19] At the outset, as scholars concede, this observation is overly simplistic in that financial literacy can be defined in various ways.[20] As one paper has observed, many definitions incorporate both knowledge

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[19] Op-Ed: Improving Financial Literacy Is Essential to Our Nation's Economic Health, Time, Apr. 9, 2012, http://business.time.com/2012/04/09/op-ed-improving-financial-literacy-is-essential-to-our-nations-economic-health/

[20] See, e.g., Annamaria Lusardi & Olivia Mitchell, The Economic Importance of Financial Literacy: Theory and Evidence, 52 J. Econ. Lit. 5, 6 (2014) (defining financial literacy as "peoples' ability to process economic information and make informed decisions about financial planning, wealth accumulation, pensions, and debt").

of financial concepts and the skills necessary to apply that knowledge to the task at hand.[21] Evaluating financial literacy may also be context-specific, as the necessary skills and knowledge will vary according to the task. This Article examines financial literacy in the context of investment decision-making, and in particular the context of retirement investing.

Annamaria Lusardi and Olivia Mitchell have conducted the most extensive and best known research on financial literacy. Their work, for the most part, measures financial literacy with a test consisting of three questions addressing numeracy, inflation, and diversification.[22] Lusardi and Mitchell, working together and with others, have incorporated these three questions into a large number of surveys both in the United States and around the world.[23] Lusardi and Mitchell's bottom line conclusion from this work is that "financial literacy can play a key role on both saving and portfolio choice."[24]

The Lusardi and Mitchell test has been highly influential. Lusardi and Mitchell and others have added to the three basic questions in some cases.[25] Other scholars have introduced their own measures of financial

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[21] See Angela Hung, Andrew M. Parker & Joanne Yoong, Defining and Measuring Financial Literacy (September 2, 2009), http://ssrn.com/abstract=1498674.

[22] See, e.g., Annamaria Lusardi & Olivia S. Mitchell. Financial Literacy and Planning: Implications for Retirement Wellbeing. In Financial Literacy: Implications for Retirement Security and the Financial Marketplace. Eds. O. S. Mitchell and A. Lusardi. Oxford, Oxford University Press: 17-39 (2011); Annamaria Lusardi & Olivia S. Mitchell. Planning and Financial Literacy: How Do Women Fare?, 98 Am. Econ. Rev. 413 (2008). 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.'[[Do not know; refuse to answer.]

[23] Lusardi & Mitchell, supra note __ (2014) (describing the use of these three questions in various surveys).

[24] Lusardi & Mitchell (2011) at 35.

[25] See, e.g., Maarten C.J. van Rooij, Annamaria Lusardi & Rob J.M. Alessie, Financial Literacy, Retirement Planning and Household Wealth, 122 Econ. J. Royal Econ. Soc. 449

literacy.[26] A common finding among the extensive literature is that levels of financial literacy are low.[27]

Commentators attribute a variety of costly financial decisions to a lack of financial literacy, 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.[28] For example Lusardi and Mitchell found that women who exhibit lower levels of financial literacy are less likely to plan for retirement.[29] Behrman et al. find that financial literacy is positively correlated with household wealth, and that the effects of literacy are "more important than schooling for explaining variation in household wealth and pension contributions."[30] Van Rooij, Lusardi and

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(2012) (using five factor text); Maarten C.J. van Rooij, Annamaria Lusardi, & Rob Alessie, Financial literacy and stock market participation, 101 J. Fin. Econ. 449 (2011) (same); Jere R. Behrman, Olivia S. Mitchell, Cindy K. Soo, and David Bravo, How Financial Literacy Affects Household Wealth Accumulation, 102 Am Econ Rev 300 (2012), http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3554245/pdf/nihms-400812.pdf. (using a "rich set of 12 questions" to study financial literacy in Chile). See also Antonia Grohmann, Roy Kouwenberg and Lukas Menkhoff., Financial Literacy and Its Consequences in the Emerging MiddleClass (working paper dated July 2014), https://www.ifw-members.ifw-kiel.de/publications/financial-literacy-and-its-consequences-in-the-emerging-middle-class/KWP%201943.pdf (using three question test to measure financial literacy in Bangkok but adding a fourth question asking subjects to name foreign banks that operate in Thailand).

[26] See generally Hung et al., supra, Table 2 (listing studies measuring financial literacy and describing structure of assessment and number of questions asked.). See also Sebastian Müller &Martin Weber, Financial Literacy and Mutual Fund Investments: Who Buys Actively Managed Funds?, 62 Schmalenbach Bus. Rev. 126 (2010), http://ssrn.com/abstract=1093305 (using an eight question quiz); Marianne A. Hilgert, Jeanne M. Hogarth, and Sondra G. Beverly, Household Financial Management: The Connection between Knowledge and Behavior, Fed. Res. Bull. 309 (2003), http://www.federalreserve.gov/pubs/bulletin/2003/0703lead.pdf (using 28 pass/fail questions); Daniel Fernandes, John G. Lynch, Jr. & Richard G. Netemeyer, The Effect of Financial Literacy and Financial Education on Downstream Financial Behaviors June 2, 2013, (challenging previous measures of financial literacy and substituting its own thirteen question scale).

[27] See, e.g., Lusardi & Mitchell (2011) at 34 (reporting "widespread financial illiteracy among older Americans").

[28] See William Gale & Ruth Levine, Financial Literacy: What Works? How Could It Be More Effective (working paper dated 2010 at 8) (describing some of the "abundant evidence" relating financial literacy to financial mistakes).

[29] Lusardi & Mitchell, supra note __ (2008).

[30] Behrman, et al. supra note__.

Alessie find those with lower levels of financial literacy are less likely to invest in stocks.[31]

Regulators have also conducted research on 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.[32] 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.[33] From these results, FINRA concluded that "Americans demonstrate relatively low levels of financial literacy and have difficulty applying financial decision-making skills to real life situations."[34]

Dodd-Frank directed the Securities & Exchange Commission (SEC) to examine investor financial literacy, and the SEC reported its results in a report in 2012.[35] The report relied upon a review of existing quantitative studies of financial literacy conducted by the Library of Congress[36] as well as on-line testing of investor understanding of various SEC-mandated disclosure documents.[37] The SEC, like FINRA, concluded that "American investors lack basic financial literacy."[38]

Scholars and policymakers are attempting to respond to evidence of poor consumer investment decisions by improving consumer financial education.[39] Thus, for example, the Consumer Financial Protection

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[31] Rooij, et al. supra note __ (stock market participation).

[32] FINRA Investor Education Foundation, National Financial Capability Study, http://www.usfinancialcapability.org/quiz.php (last visited Sept. 12, 2014).

[33] See also Kimberly Palmer. How to Measure Your Financial Literacy, US News & World Report Money, June 20, 2014, http://money.usnews.com/money/blogs/alpha-consumer/2014/06/20/how-to-measure-your-financial-literacy (describing results of FINRA's survey of 25,000 adults in 2009 and 2012, using these questions).

[34] See FINRA Investor Education Foundation, National Financial Capability Study, U.S. Survey Data at a Glance, http://www.usfinancialcapability.org/results.php?region=US (reporting survey results).

[35] Office of Investor Educ. & Advocacy, SEC Staff Study Regarding Financial Literacy Among Investors, 15 (2012), available at http://www.sec.gov/news/studies/2012/917-financial-literacy-study-part1.pdf.

[36] Id. at vii.

[37] Id. at ix.

[38] Id.

[39] See, e.g., William G. Gale, Benjamin H. Harris & Ruth Levine, Raising Household Saving: Does Financial Education Work?, Social Security Bulletin, Vol. 72, No. 2, 39,

Bureau has identified one of its objectives as developing tools for more effective investor education.[40] Similarly on June 25, 2013, President Obama signed an executive order establishing the President's Advisory Council on Financial Capability for Young Americans.[41] The Council, led by the US Treasury Department is devoted to evaluating financial capability and developing tools to improve it.[42] The Schwab Foundation, under the leadership of Carrie Schwab-Pomerantz has worked to develop investor education programs for more than 30 years.[43] As Schwab-Pomerantz explains: "financial education can change lives."[44]

For investor education to improve financial decision-making, 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; future will work focus on the second.[45]

2012, avail. at http://ssrn.com/abstract=1953629 (surveying requests of studies on the effectiveness of investor education).

[40] See Prepared Remarks of Richard Cordray, Director of the Consumer Financial Protection Bureau FINRA Investor Education Conference, Washington, DC May 29, 2013, http://www.consumerfinance.gov/newsroom/director-cordray-remarks-at-the-finra-investor-education-conference/ (describing CFPB's investor education efforts).

[41] Executive Order--Establishing the President's Advisory Council on Financial Capability for Young Americans, June 25, 2013, http://www.whitehouse.gov/the-press-office/2013/06/25/executive-order-establishing-presidents-advisory-council-financial-capab

[42] Cyrus Amir-Mokri, President Obama Creates New Advisory Council Focused on the Financial Capability of Young Americans, Treasury Notes, June 25, 2013, http://www.treasury.gov/connect/blog/Pages/President-Obama-Creates-New-Advisory-Council-Focused-on-the-Financial-Capability-of-Young-Americans.aspx.

[43] Carrie Schwab-Pomerantz, Charles Schwab website, http://www.schwab.com/public/schwab/resource_center/expert_insight/schwab_experts/carrie_schwab_pomerantz.html (last visited May 2, 2016).

[44] Andrew S. Ross, Schwab-Pomerantz: Visionary wants financial security for all, SFGate, Feb. 26, 2015, http://www.sfgate.com/visionsf/article/Schwab-Pomerantz-Visionary-wants-financial-6039360.php

[45] To date, studies have questioned the effectiveness of investor education in addressing poor financial literacy. See, e.g., Daniel Fernandes, John G. Lynch, Jr., & Richard G. Netemeyer, Financial Literacy, Financial Education, and Downstream Financial Behaviors , 60 Mgt. Sci., 1861, 1872 (2014) (conducting meta-analysis of 168 papers on financial education and finding that "financial education interventions studied explained only about 0.1% of the variance in the financial behaviors studied, with even weaker

B. Financial Literacy, Regulation and Retirement Investing

The role of financial literacy is particularly important in the context of retirement savings.[46] 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.[47] 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.[48] Critics attribute the crisis, in part, to poor decisions by plan participants.[49] Studies suggest that participants in these plans make numerous mistakes including saving too little,[50] choosing suboptimal investment options,[51] and paying excessive fees.[52] Understanding the role of financial literacy in contributing to poor investment decisions is critical to the policy choice of whether to subject

average effects of interventions directed at low-income rather than general population samples"); Lauren E. Willis, Against Financial Literacy Education, 94 Iowa L. Rev. 197 (2008-2009); Lewis Mandell & Linda Schmid Klein, The Impact of Financial Literacy Education on Subsequent Financial Behavior, 20 J. Fin. Couns. & Plan. 15 (2009) (finding high school financial education course did not improve financial behavior).

[46] See Lusardi & Mitchell (2011) (studying financial literacy among older Americans and its implications for retirement planning).

[47] Fisch & Wilkinson-Ryan Costly Mistakes, supra note 1, at 614.

[48] See, e.g., Edward Siedle, The Greatest Retirement Crisis In American History, Forbes, March 20, 2013, http://www.forbes.com/sites/edwardsiedle/2013/03/20/the-greatest-retirement-crisis-in-american-history/

[49] See, e.g., Jeff Rose, 4 Serious Retirement Plan Errors to Avoid. US News & World Report, Money, Mar. 9, 2015, http://money.usnews.com/money/blogs/on-retirement/2015/03/09/4-serious-retirement-plan-errors-to-avoid

[50] See James J. Choi, David Laibson, & Brigitte C. Madrian, $100 Bills on the Sidewalk: Suboptimal Investment in 401(k) Plans, 93 Rev. Econ. & Stat. 748 (2011)

[51] Tang, et al., The efficiency of sponsor and participant portfolio choices in 401(k) plans, 94 J. Pub. Econ. 1073 (2010) (finding that investors construct inefficient portfolios, reducing their potential retirement wealth by one-fifth); Alicia A. Munnell & Annika Sunden, 401(k) Plans Are Still Coming Up Short, Issue Brief dated March 2006, Center for Retirement Research at Boston College, http://crr.bc.edu/briefs/401k-plans-are-still-coming-up-short/

[52] Josh Boak & Paul Wiseman, High fees eroding many 401(k) retirement accounts, AP, Spr. 13, 2014, http://bigstory.ap.org/article/savers-beware-fees-may-be-shrinking-your-401k

retirement savings to greater regulation as well as the form that such regulation should take.

The Employee Retirement Income Security Act of 1974 (ERISA) regulates most employee benefit plans, including employer-provided retirement plans.[53] ERISA's mandates are implemented primarily by the Department of Labor.[54] Regulation of retirement investing reflects a tension between two policy objectives. On the one hand, the Department of Labor 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.[55] On the other hand, wary perhaps of the pitfalls of mandating a specific retirement strategy or product, the regulations privilege investor autonomy.[56]

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.[57] Under ERISA, a person

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[53] Pub. L. No. 93-406, 80 Stat. 829 (1974).

[54] See Colleen E. Medill, The Individual Responsibility Model of Retirement Plans Today: Conforming ERISA Policy to Reality, 49 Emory L.J. 1, 4 (2000) ("the Department of Labor . . . interpret[s] and appl[ies] ERISA's statutory provisions").

[55] 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 generally Anne Tucker, Retirement Revolution: Unmitigated Risks in the Defined Contribution Society, 51 Hous. L. Rev. 153 (2013) (describing employer obligations under ERISA); see also 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 (8th Cir. Mo. 2014) (imposing liability on plan fiduciaries for allowing the plan to pay excessive record-keeping 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 (2014) (criticizing paternalism imposed through DOL's fiduciary duty approach).

[56] 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 __ at 618 (observing that courts have frequently accepted alleged deficiencies among investment options so long as plan offered participants a sufficient number of alternatives).

[57] See Medill, supra note _ at 27 ("ERISA's statutory scheme is built around the concept of a 'fiduciary.'").

becomes a fiduciary by giving investment advice, exercising discretionary authority over the management of a retirement plan, exercising the control over plan assets or by having discretionary authority over the administration of a plan.[58] A person can also become a fiduciary by providing investment advice for a fee.[59]

Under ERISA, fiduciaries are subject to strict regulation including mandated legal obligations, transaction restrictions and liability exposure.[60] Employers who might otherwise be subject to this 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.[61] 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.[62]

Notably, the 404(c) regulations do not limit the employer's obligation to construct an appropriate plan. In its recent decision in Tibble v. Edison International,[63] 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 in scope and did not specify the

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[58] 29 U.S.C.A. § 1002(21)(A)(i) and (iii)).
[59] 29 USCA § 1002(21)(A)(ii).
[60] Among other things, ERISA prohibits fiduciaries from all conflicts of interest absent an explicit exemption. ERISA § 404(a)(1), 29 USCS § 1104(a)(1). This standard has come to be known as ERISA's exclusive benefit rule. See Daniel Fischel & John H. Langbein, ERISA's Fundamental Contradiction: The Exclusive Benefit Rule, 55 U. Chi. L. Rev. 1105, 1108 (1988).
[61] 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 57 Fed. Reg. 46,906 (1992) (codified at 29 C.F.R. 2550.404c-1). 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." 29 C.F.R. 2550.404c-1 (1997). Employers, however, are treated as fiduciaries if they provide their employees with investment advice. § 1002(21)(A)(ii).
[62] Id.
[63] 135 S. Ct. 1823 (2015).

scope of this monitoring function, it focused increased attention on the important role played by plan fiduciaries.[64]

Employers and other advisors are permitted to provide investor education, but the law 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, of course, unclear.[65] 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.[66] The Pension Protection Act of 2006 responded to this problem by creating an explicit exemption designed to encourage educational programs.[67] Some commentators have argued that the statute should go further and impose an affirmative obligation on employers to provide investor education.[68] Employees would likely be receptive; one recent study reported that, "89 percent of employees want their employer to make personal financial planning advice available."[69]

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[64] Blaine F. Aikin, Ramifications of Supreme Court decision on 401(k) fee lawsuit run deep, Inv. News, June 1, 2015, http://www.investmentnews.com/article/20150601/FREE/150609998/ramifications-of-supreme-court-decision-on-401-k-fee-lawsuit-run-deep

[65] See Scott Mayland, 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, 670 (2014) explaining that, even after the PPA, "the line between the provision of advice and education is still not clear").

[66] See, e.g., Medill, supra note __ 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. & LAB. L. 1, 21 (2002) (observing that an employer that provides too much information may be deemed to have provided investment advice).

[67] Pension Protection Act of 2006, Pub. L. No. 109-280, 120 Stat. 780; Employee Retirement Income Security Act of 1974, 29 U.S.C. § 1108(g) (2012); I.R.C. § 4975 (2012); 29 C.F.R. § 2550.408(g)-1 (2013). Regina T. Jefferson, Increasing Coverage in Today's Private Retirement System, 6 Drexel L. Rev. 463, 483 (2014). Prior to the enactment of the PPA, Congress and the DOL engaged in several other initiatives designed to increase investor education. See Medill, supra note __ at 50-51 (describing and critiquing these initiatives).

[68] See Jefferson, supra note __.

[69] 401k Trends , supra note __ (citing CIGNA study).

On April 6, 2016, the DOL released its long-awaited fiduciary rule.[70] The rule, which 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,[71] heightens the regulatory obligations of those advisors.[72] Although the final rule has been described as substantially "watered down" from a prior proposal that had been heavily criticized,[73] the new regulatory requirements have the potential to reduce

[70] Definition of the Term ''Fiduciary''; Conflict of Interest Rule—Retirement Investment Advice, 81 Fed. Reg. 20946 (Apr. 8, 2016), http://www.dol.gov/ebsa/regs/conflictsofinterest.html. Congress required the SEC to study the effectiveness of the regulations governing brokers and investment advisors as part of the Dodd-Frank Act of 2010. Dodd–Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, 124 Stat. 1376, §913 (2010) (codified as amended in scattered sections of 7, 12, and 15 U.S.C.). The statute authorized the SEC to adopt a fiduciary standard for brokers. Id. The SEC staff conducted a study and, in 2011, released a recommendation that the agency adopt a unified fiduciary standard applicable to both brokers and investment advisors. Staff of the US Securities & Exchange Commission, Study on Investment Advisers and Broker-Dealers (Jan. 2011). To date, the SEC has failed to adopt a fiduciary standard. See, e.g., Justin Baer & Andrew Ackerman, SEC Head Backs Fiduciary Standards for Brokers, Advisers, Wall St. J., Mar. 17, 2015, http://www.wsj.com/articles/sec-head-seeks-uniformity-in-fiduciary-duties-among-brokers-advisers-1426607955 (reporting that action on adopting a fiduciary standard at the SEC has "stalled" "in part because of the complexity of the law").

[71] In February 2015, the White House Council of Economic Advisers released an analysis reporting that that "conflicted advice from brokers costs investors $17 billion per year." White House Report, supra note __. 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." US Department 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://www.dol.gov/ebsa/newsroom/fsconflictsofinterest.html (quoting Feb. 23, 2015 statement by President Obama).

[72] 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. Advisors can engage in certain prohibited transactions if they comply with the requirements of the Best Interest Contract Exemption. 29 CFR Part 2550.

[73] See Ashlea Ebeling, DOL Issues Final Fiduciary Rule, Does It Fall Short?, Forbes, Apr. 7, 2016.

the access by ordinary investors to professional advice in connection with retirement planning.[74]

Critics expressed particular concern about the potential effect of the fiduciary rule on the provision of investor education. The DOL response is designed to provide employers with continued protection for investor education programs. In addition to containing an extensive discussion of investor education which, pursuant to the rule, does not constitute the provision of investment advice,[75] the DOL adopting release explains that "the 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."[76]

Despite the carve-out for investor education, there is little question that the fiduciary rule will increase the costs associated with the provision of 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 in saving for retirement.[77] There is also evidence that individuals with a financial advisor are better long

[74] See Tara Siegel Bernard, Customers First' to Become the Law in Retirement Investing, N.Y. Times, Apr. 6, 2016 (quoting Jules Gaudreau, president of the National Association of Insurance and Financial Advisors as expressing concern that "such a complex rule will result in higher costs and reduced access to advice, service and products for retirement savers."). Preliminary studies of a somewhat different regulatory reform adopted in the United Kingdom found evidence of a "guidance gap" of 43 million investors who may be unable or willing to obtain professional financial guidance because of the new regulatory restrictions. Andrew Clare, The Guidance Gap An investigation of the UK's post-RDR savings and investment landscape (January 2013). See also Andrew Clare et al., The impact of the RDR on the UK's market for financial advice (June 2013). UK regulators recently announced that they had launched a review to investigate the extent of this guidance gap. Simon Jessop, UK launches review of financial advice market. Reuters, Aug. 3, 2015, http://uk.reuters.com/article/uk-britain-financials-advice-idUKKCN0Q81GH20150803; see also Kent Mason, Davis & Harman LLP, UK Launches Review of "Advice Gap" For Small Accounts Following a 2013 Rule Change with Effects Identical to What DOL Now Proposes (white paper 2015).

[75] § 2510.3–21(b)(iv).

[76] Id. at 20976.

[77] Wyman, supra note __ at 6.

term investors.[78] 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 the extent and effect of this knowledge gap.

III. 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 (the MTurk subjects) to participate in internet-based research for compensation.[79] In all, 146 MTurk subjects participated in the study.[80] We report demographic information on the full group in Table 1.

Table 1. MTurk Respondents Demographic Variables

Male	58%
Median Age	33
Four Year College Degree or more	55%
Employed full or part time	66%
Annual Household Income <$50,000	55%

Our second group consisted of professional advisors. With the cooperation of the Financial Information Regulatory Association (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."

[78] Id. See also Vanguard, The Value of Managed Account Advice, Aug. 2015 (finding that 6 of 10 long term retirement investors increased their savings by using professional advice).

[79] See Fisch & Wilkinson-Ryan, supra note 1 (describing MTurk).

[80] 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.

We received responses from 60 professional advisors.[81] Each of the sixty professional 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

Male	79%
Median Age	46
Four Year College Degree or more	96%
Median Time on Survey	23 minutes
Median number funds invested in	4

Although we attempted to make the MTurk and professional advisor task as similar as possible, there are multiple reasons these groups are not directly comparable, in addition to them being drawn from different subject pools. They received the survey at slightly different times.[82] The instructions were about giving advice to a hypothetical client (the advisors) versus making allocations for yourself (the MTurk subjects), although we attempted to make the most relevant factors the same.[83] Also, most of the individuals who accessed the survey via MTurk completed the survey, while many advisors looked at the survey instructions, or did only the allocation, but did not complete the task,[84] so the advisors who did complete the survey may be especially interested in volunteering to perform this kind of task. Despite these types of differences, we still believe we can share insights about how the two groups approach the task of retirement investing by looking at their choices and knowledge levels, and making cautious comparisons.

B. Study Design

We examined financial literacy in the context of a specific investment decision – choosing investments in a 401(k) plan. Drawing

[81] We included all survey responses that were fully completed. We did not include 82 additional surveys were only partially completed. (22 of these completed the allocation, but not the following questionnaire. The remainder did not complete even the allocation)
[82] The advisor responses were gathered between September, 2015 and February, 2015. The MTurk responses were gathered in November, 2015.
[83] Single, only retiring after 30 years, etc.
[84] *See* supra note 81.

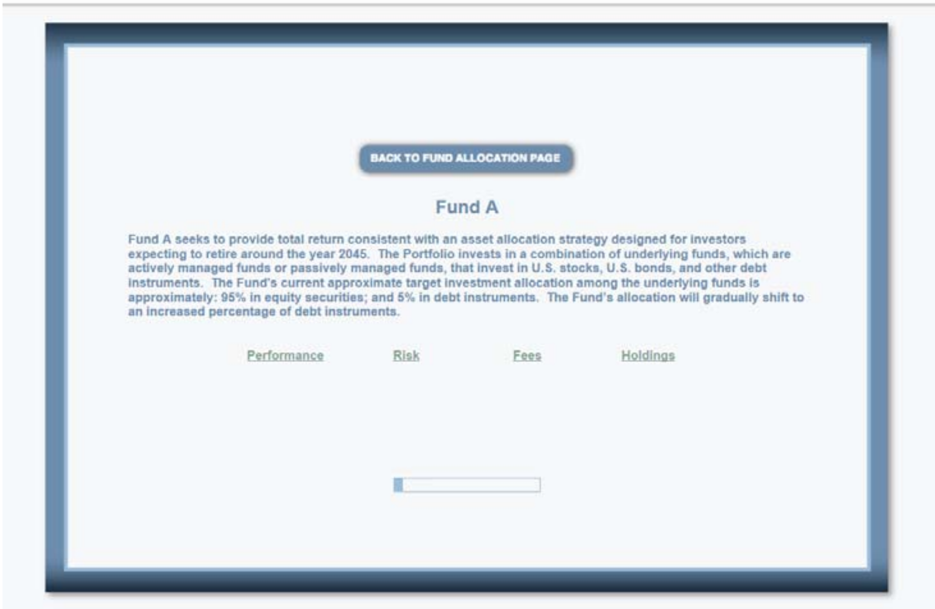
upon our prior work, we constructed a web-based interface that allowed subjects to allocate a hypothetical $10,000 among ten investment options as part of a 401(k) plan. MTurk subjects were told to assume that they were not going to be retiring for at least 30 years and that an algorithm would simulate 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 they would be paid a percentage of their portfolio's total value at the end of thirty years.

For the professional advisors, we revised the study instructions slightly to ask the subjects to allocate $10,000 on behalf of a hypothetical single client 30 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 were able to see the portfolio's total value at the end of thirty years on the final page of the survey.

Our investment options 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 (i.e. equity index fund).

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 that included attitudes about investing, their objectives while completing their allocation, questions seeking to assess their financial literacy, and demographic information.[85] The MTurk subjects and professional advisors were given the same investment alternatives and asked to answer the same questionnaire following their allocation decision.[86]

At the end of the questionnaire we calculated a predicted value of the selected portfolio.[87] To simulate the performance of each of the investment options, we used a pre-determined 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

[85] We describe the financial literacy analysis in more detail below.

[86] 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, while we asked MTurk subjects about their employment status.

[87] The value of a subject's portfolio was only disclosed to that subject after he or she completed the study. Professional advisors saw the value on the final page of the survey they completed; MTurk subjects saw the value at the conclusion of the full study.

our menu.[88] The value of a subject's portfolio was heavily influenced by the subject's investment decisions. A portfolio that was invested 100% 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% 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 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 in more detail below. Significantly, we were interested in a number of aspects of the decision-making 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.[89] 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,[90] those losses are potentially dwarfed by the revenue sacrificed by excessive risk aversion.

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[88] 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, The best investment advice ever, Marketwatch, Nov. 5, 2014, http://www.marketwatch.com/story/the-best-investment-advice-ever-2014-06-11 (discussing the equity risk premium). Given the thirty year time-frame of the study, we did not reduce the value of portfolios that incorporated a higher level of risk, recognizing that the literature on the appropriate level of risk for investments with a long time horizon is complex. See, e.g., Christian Gollier & Richard J. Zeckhauser, Horizon Length and Portfolio Risk, 24 J. Risk & Uncertainty, 195 (2002).

[89] See Fisch & Wilkinson-Ryan, supra note 1.

[90] Cf. Ian Ayres & Barry Nalebuff, Lifecycle Investing: A New, Safe, and Audacious Way to Improve the Performance of Your Retirement Portfolio (2010).

Although economists typically treat risk aversion as exogenous, 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 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.[91] 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.[92]

We also included four questions that tested subject numeracy.[93] 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.

Table 3. Quiz performance, by item, for each subject pool

Question	Turk Percent Correct	FINRA Percent Correct
MC1: Best returns from Stocks	63%	98%%
MC2: Stock = own part of company	89%	98%%
MC3: Bond = lend money to company	80%	98%%

[91] See Fisch, et al., Financial Literacy in the Workplace (working paper 2015) (reporting results from use of 15 point index).

[92] To evaluate the reliability of our 19 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 (1951). For the 19 point scale, Cronbach's Alpha is 0.72, which is in the range of what is considered reliable.

[93] We test numeracy using four questions about the effect of compounding and incorporating increasing degrees of complexity.

MC4: Safest bond is treasure	87%	100%
MC5: Interest rates go up, bond prices go down	52%	100%
MC6: Mutual funds pool with other investors	73%	100%
MC7: Fund balanced for retirement fund is target date fund	53%	100%
MC8: Relationship btw risk and returns in long run is positive	48%	73%
MC9: Longer time horizon, take on more risk	69%	100%
TF10: Index fund tracks market index	90%	98%
TF11: Possible to lose money in bond	61%	100%
TF12: Professional managed funds do better	31%	70%
TF13: Index funds vary based on manager experience	35%	68%
TF14: Possible to lose money in mutual fund	89%	100%
TF15: Expenses do not vary among mutual funds	78%	98%
TF16: Diversification reduces variability	44%	67%
TF17: Diff. between bank and money market is FDIC insurance	74%	82%
TF18: Mutual funds less diversified than indiv. Stocks	78%	97%
TF19: Target dates cheaper than individual funds	30%	46%
N1: Return in 2 years	61%	78%
N2: Return in 30 years	38%	75%
N3: Fees paid in 30 years	42%	50%
N4: Fees paid in 30years	35%	42%
LM1: Compounding	90%	98%
LM2: Inflation and Savings	84%	98%
LM3: Safety of Stocks vs. Mutual Funds	80%	96%
Mean 19-point score	12.3	16.9
Mean Numeracy Score	1.75	2.4
Mean LM score	2.53	2.9

As the table indicates, and as one might predict, 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 were able to answer virtually all of the financial literacy questions accurately, generating a correct response rate of about 90%, as opposed to the MTurk subjects who answered correctly only about 65% of the time on a true/false and multiple-choice task. All but one of the professional advisors scored 14 or higher on the 19 question scale. Only three of our 60 professional advisors got any of the L&M questions wrong. Our results thus document a clear knowledge gap. We turn, in the next section, to exploring the implications of that knowledge gap by examining the relationship between financial literacy and investment performance.

IV. 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 19 point literacy scale. The dividing line was at the median score of 13. Subjects with a financial literacy score of less than 13 were categorized as low-literacy (low-lit) and those getting 13 or more items correct were categorized as high-literacy (high-lit). Table 4 provides more detail on the two groups. Note that the median literacy level in the high-lit MTurk group equaled the bottom score (except for one outlier) of the entire professional advisor subject pool:

Table 4. MTurk financial literacy by group

	Min.	1st quartile	median	mean	Third quartile	Max.
Low-literacy MTurk	6.0	9.0	10.0	10.07	11.0	12.0

High-literacy MTurk	13.0	13.0	14.0	14.54	15.25	18.0

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 in achieving this objective is correlated with financial literacy. Because we constructed the algorithm that calculated portfolio value, and because that algorithm in turn depends on certain assumptions about asset allocation and return, we were concerned that the constructed portfolio value did not reflect a sufficiently objective measure of decision-making 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.[94] Based on the information provided to our subjects, Fund D was designed to dominate the other investment options on every dimension except risk.[95] 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.[96]

A variety of commentary focuses on the role of disclosure in improving investor performance. A question in much of this literature concerns the degree to which investors search for and use the information that is provided 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 view the number of clicks as a rough measure of investment

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[94] We consider in more detail below our subjects' choice among the 10 investment alternatives.

[95] We consider risk separately, as discussed below.

[96] See, e.g., Matt Levine, Labor Department Wants to Tweak Your Retirement Plan, Bloomberg, Apr. 15, 2015, http://www.bloombergview.com/articles/2015-04-15/labor-department-wants-to-tweak-your-retirement-plan (describing the DOL's "bias toward passive investing").

performance. A similar proxy is provided by the amount of time our subjects spent on the exercise.[97] Finally, incorporating our earlier research on the importance of fees,[98] we also considered the average fees paid by our subjects.[99]

Table 5 reports the differences among subject groups. Financial literacy was highly associated with performance. The high-lit MTurk subjects selected portfolios that were worth an average of $21,000 more than the low-lit MTurk subjects. Similarly, the professional advisors generated portfolios worth an average of 20% more than those 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-lit MTurk subjects, a difference of 33%.

Table 5. Outcome Variables by group

	Low Literacy	High Literacy	Prof advisors
Returns	70,389.78	91,575.08	97,166.02
	t=5.94, df=142.5, p<.001		t=1.67, df=127.7, p=0.097
Cheap Index Fund Investment	8.1	19.3	27.5
	t=4.14, df=84.2, p<.001		t=1.92, df=116, p=0.058
Fees Paid[100]	.77	.69	.63
	t=3.09, df=104.7, p=0.003		t=1.45, df=124.8, p=0.15
Total Clicks	17.9	29.0	25.6
	t=2.97, df=139, p=0.004		t=0.74, df=118.7, p=0.462

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 clicks.

[97] Because of design limitations in the survey format, time is a noisy variable, both because our subjects could have been doing other things while the survey was open 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.

[98] See Fisch & Wilkinson-Ryan, supra note 1.

[99] 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.

[100] To calculate fees paid, we omitted the cash account.

Our professional advisors outperformed the high-lit MTurk subjects along those dimensions as well except for clicks.[101]

These differences could obviously 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 relationship between demographic characteristics and financial literacy. The results are shown in Table 6 below:

Table 6: Regression: DV=FL Score 19

	Estimate	SE	p-value
Intercept	11.48		
Experience	0.64	0.22	0.005
Age	0.41	0.21	0.055
Male	1.30	0.42	0.003
Education	0.56	0.22	0.013
Income	0.10	0.23	0.654

Multiple R-squared: 0.1875 Adjusted R-squared: 0.1581
F-statistic: 6.369 on 5 and 138 DF, p-value < .001

As Table 6 shows, financial literacy is associated with gender (males are more financially literate) and investment experience, and somewhat correlated with education. These findings are predictable and consistent with the existing literature.[102]

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 higher number is a higher risk tolerance.

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[101] The difference in clicks may be explained by the professional advisors' greater familiarity with the task.

[102] See, e.g., Annamaria Lusardi, What's Behind the Financial Literacy Gender Gap?, Wall St. J. Nov. 2, 2015 (reporting study results showing persistent gender gap in financial literacy).

Table 7. Risk and Financial Literacy

	Low Literacy	High Literacy	Prof advisors
Mean Risk Tolerance	2.6	3.7	3.8

Overall 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.

Table 8: Regression: DV=Return

	Estimate	SE	p-value
Intercept	80596.8		
FL Score 19	7034.8	2094.3	.001
Numeracy Score	2519.3	1815.1	.167
Risk Score	8208.6	1836.3	.000
Experience	948.4	1908.0	.620
Age	-1237.8	1815.3	.470
Male	-350.5	1795.2	.846
Education	2115.1	1918.7	.272
Income	947.2	1907.9	.620

Multiple R-squared: 0.3443 Adjusted R-squared: 0.3046
F-statistic: 8.686 on 8 and 132 DF, p-value: < .001

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. In addition, although numeracy – the ability to solve math problems related to investing, specifically compounding – is highly correlated with financial literacy,[103] numeracy is not independently predictive of success in navigating the investment choices. When other variables are accounted for, numeracy has no relationship to investment decisions. Finally, for 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 so uniformly high that there was little differentiation and thus little predictive power. We did analyze one group separately, the group we might call the "uber-high" respondents who scored either 18 or 19 on the 19-point scale. They had marginally significant higher returns by our measure of returns (t=1.80, p=.081) and paid noticeably less in fees,

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[103] 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 with find that both indices have independent explanatory power.

Correlation Matrix, independent variables

	FL Score 19	LM Score	Numeracy Score	Risk Score	Experience Score
FL Score 19		.40	.34	.36	.29
LM Score			.19	.30	.13
Numeracy Score				.06	.08
Risk Score					.11

paying an average of 50 basis points rather than 69 (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 8 shows the allocation of funds for each subject group.

Table 8. Asset Allocation, MTurk and FINRA, means and medians

Fund (fee)	MTurk Low Literacy	MTurk High Literacy	FINRA
A: Target Date Fund (.89%)	11.4 [10]	12.8 [5]	17.8 [10]
B: Fixed Income Fund (.89%)	9.8 [8]	4.7 [0]	5.1 [0]
C: Fixed Income Fund (.22%)	10.9 [10]	9.4 [5]	6.1 [0]
D: Cheap Index Fund (.17%)	8 [10]	19.3 [10]	27.5 [20]
E: Dominated Index Fund (.67%)	7.1 [7]	10.6 [8]	11.1 [0]
F: Managed Fund (.67%)	7.8 [10]	10.7 [10]	12.3 [10]
G: Expensive Managed Fund (1.25%)	11.5 [10]	13.6 [10]	10.2 [5]
H: Managed Fund (.62%) (closet index)	10.4 [10]	11.4 [10]	7 [0]
I: Money Market (.16%)	12 [5]	3.9 [0]	1.6 [0]
J: Cash (no fee)	11.1 [9]	3.5 [0]	1.3 [0]

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

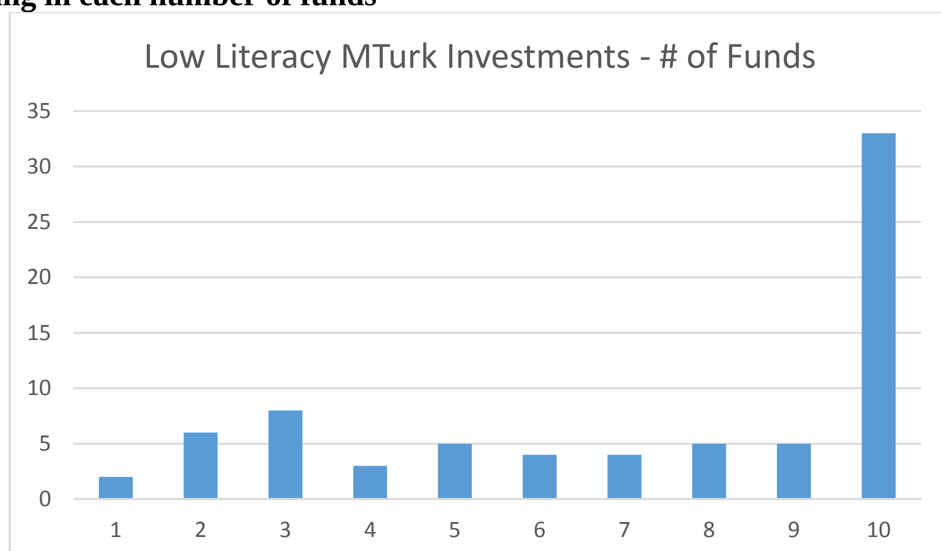
As noted above, one of the challenges in evaluating retirement investing is setting an appropriate benchmark – that is, normatively evaluating a given investment strategy. In order to limit this concern, our study focuses largely on asset allocation decisions and on our subjects' ability to make rational 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 naïve diversification.[104] Subjects did not appear to "pick the best funds" but instead spread their investment across the full range of alternatives.[105] We observed variation in this pattern, however, and flagged the question of whether what investor characteristics explained naïve diversification as a subject for future study.[106] In this project we explored the question in more detail.

As Figures 2-4 show, our investor groups differed dramatically with respect to the extent to which they engaged in naïve diversification. The low-lit MTurk subjects invested in an average of 7.2 funds, and fully 44% of them invested in all 10 funds. At the extreme, 21 MTurk subjects invested 10% of their portfolio in each of the ten options.

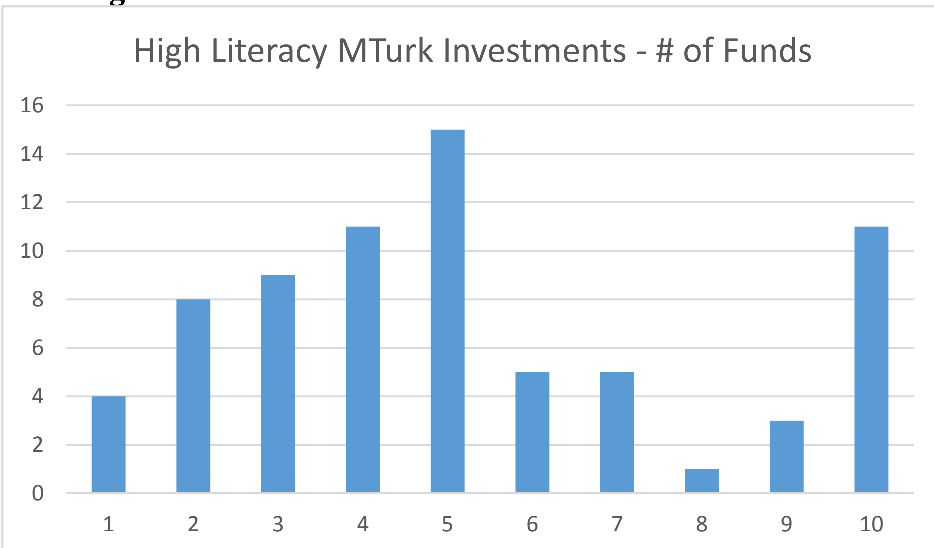
Figure 2. Low Literacy MTurk Subjects, percent of subjects investing in each number of funds



[104] See Shlomo Benartzi & Richard H. Thaler, Naive Diversification Strategies in Defined Contribution Saving Plans, 91 AM. ECON. REV. 79 (2001) (explaining concept of naïve diversification).
[105] Fisch & Wilkinson-Ryan, supra note 1, at 636.
[106] Id.

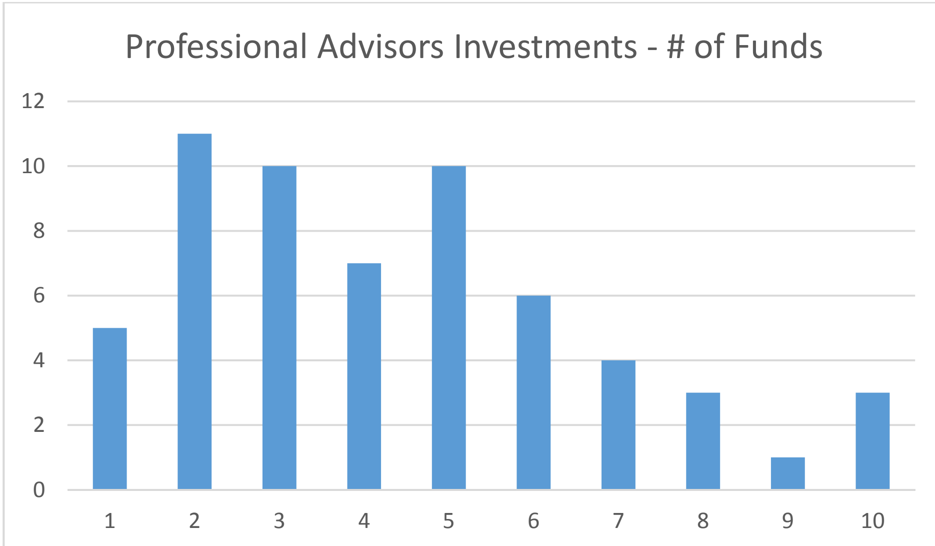
The high-lit MTurk subjects invested in far fewer funds as shown in Figure 3. The average number of funds they invested in was 4.8, and only 15% invested in all 10 fund options.

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% (three subjects) invested in all ten funds. Not one of the professional advisors engaged in the 1/10 investment strategy of allocating 10% of their portfolio to each of the ten investment options. All these differences are highly significant.

Figure 4. FINRA subjects, percent of subjects investing in each number of funds



The professional advisors appeared to recognize, in a way that the MTurk subjects did not, 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.[107] Importantly, as discussed in the next part, our fund menu in this study contained dominated funds that investors should have rejected in favor of alternatives. Accordingly, naïve 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.[108]

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[107] As one subject explained: "2 funds seemed enough as F, G & H look the same as do B & C and D & E."
[108] 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% of the high-lit MTurk subjects invested nothing in the expensive index fund, but only 27% of low-lit MTurk subjects invested 0. Oddly, 42% 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, that had holdings and returns that were virtually identical to those of the index funds.[109] 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. 63% of FINRA subjects invested nothing in the closet index fund, compared to 33% of the MTurk subjects. Similarly 44% of MTurk subjects invested nothing in the dominated fixed income fund, and 67% of 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 other work and that is of substantial regulatory concern.[110] 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 investment alternatives may not provide employees with sufficient protection.

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[109] See Fisch, supra note 9, at 2018 (explaining closet index funds).

[110] See, e.g., Richard Thaler & Cass Sunstein. Nudge: Improving Decisions About Health, Wealth, and Happiness (2008) (discussing menu effects); Olivia S. Mitchell, Gary R. Mottola, Stephen P. Utkus & Takeshi Yamaguchi, Menu Effects and Retirement Saving: The Impact of Life Cycle Funds on 401(k) Plan Portfolios (2008) (evaluating introduction of target date funds into menu of retirement plans).

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.[111] 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.[112] 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 9 below.

Table 9. Mean Investment Level – Cash and Money Market

Fund	Low-lit MTurk	High-Lit MTurk	Professional Advisors
I: Money Market	12.0	4.0	1.6
J: Cash	11.1	3.5	1.3

The allocation differences were consistent in our subjects' understanding 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

[111] See, e.g., J. Bradford DeLong & Konstantin Magin, The U.S. Equity Return Premium: Past, Present, and Future, 23 J. Econ. Persp. 193, 195 (2009) (observing an average historical equity risk premium of approximately 5% for investors with a 20 year time horizon since 1901).

[112] In the real world, investors might allocate a percentage of their portfolio to cash in order 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.

the majority of the portfolio in equity—an average of 80%.[113] 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-lit 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-lit 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.[114] 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.

V. Implications

We document the importance of financial literacy in retirement investing – limited financial literacy is associated with poor investment decision-making. 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

[113] We considered allocations to the target date fund, which was described as consisting of 95% equity at the time of the study, as an allocation to equity.

[114] Congress authorized automatic enrollment in 401(k) plans in the Pension Protection Act of 2006. Pension Protection Act of 2006, Pub. L. No. 109-280, § 902, 120 Stat. 780, 1033-39. The DOL subsequently adopted regulations specifying the types of investment options that could be used as default options – so called qualified default investment alternatives (QDIAs). See 29 C.F.R. § 2550.404c-5 (2008). Target date funds were included as QDIAs. See Leslie Wayne, Mutual Funds with Targets, and Misfires, N.Y. TIMES, June 25, 2009, at B1 (describing the DOL “safe harbor” for target date funds).

of participant-directed investing as the primary vehicle for retirement savings. Whether or not investor performance 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.[115]

Our study, consistent with other research, shows, however, that the inclusion of inferior options, duplicative options or simply too many choices may reduce the quality of employees' decisions.[116] 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*,[117] the courts have generally been reluctant to second-guess an employer or plan sponsor's selection of investment options.[118] There are good reasons for this – as noted, the literature does define the optimal investment strategy or options for retirement investing with precision and after-the-fact scrutiny is invariably subject to hindsight bias.[119] Nonetheless, the performance of both our

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[115] See, e.g., Fisch & Wilkinson-Ryan, supra note 1, at 618-19; Ayres & Curtis, supra note __, 124 Yale L.J. 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").

[116] See, e.g., Ayres & Curtis, supra; Sheena S. Iyengar & Emir Kamenica, Choice Proliferation, Simplicity Seeking, and Asset Allocation, 94 J. PUB. ECON. 530, 530-38 (2010).

[117] 135 S. Ct. 1823 (2015).

[118] Tussey v. ABB, Inc., 746 F.3d 327, 338 (8th Cir. 2014) (vacating district court's finding of liability as reflecting improper "hindsight bias").

[119] See id. at 338 (explaining that plan administrator's choice of investment options is entitled to deference because "While it is easy to pick an investment option in retrospect

high-lit MTurk subjects and our professional advisors suggests that more rigorous employer screening of fund options can eliminate some potential investor mistakes.

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 30 year time horizon of the allocation decision warranted substantial equity exposure – facts that the low-lit investors seemed both 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,[120] our study suggests that, at least in the investing context, some degree of risk aversion may, itself, be a mistake.[121] 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.[122]

(buy Apple Inc. at $7 a share in December 2000 and short Enron Corp. at $90 a share), selecting an investment beforehand is difficult.")

[120] See, e.g., Thomas Dohmen, et al., Individual Risk Attitudes: measurement, Determinants and Behavioral Consequences, 9 J. Eur. Econ. Assoc. 522, 524 (2011) (In economics it is common to think of a single trait as governing risk-taking in all contexts").

[121] This possibility has long been suggested by studies showing greater risk tolerance by the wealthy. For an early example see Richard A. Cohn, Individual Investor Risk Aversion and Investment Portfolio Composition, 30 J. Fin. 605, 618 (1975) (finding "a strong pattern of decreasing relative risk aversion").

[122] See, e.g., Merriman, supra note __ (stating that "Every 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.").

This is not to say that the Department of Labor'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. 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-lit 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 saving plans are now the norm, but many people lack the ability to make the best choices for their own retirement. 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 decision-making. 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 substantial performance differences. Our study demonstrates low literacy investors make certain types of predictable mistakes that are likely substantially to reduce their investment returns. Employers, through better plan design and professional advisors by encouraging low literacy investors to increase their risk tolerance, have the potential to mitigate against some of the mistakes investors commonly make in retirement investing. Professional advice may also reduce investors' discomfort with the decision-making process and lead to higher levels of participation and investment.