PLAN FORMAT AND PARTICIPATION IN 401K PLANS: THE MODERATING ROLE OF INVESTOR KNOWLEDGE

Maureen Morrin  
Professor of Marketing  
Rutgers University  
227 Penn St.  
Camden, NJ 08102  
Phone: 856-225-6713  
Fax: 856-225-6231  
Email: mmorrin@rutgers.edu.

Susan Broniarczyk  
Sam Barshop Centennial Professor of Marketing Administration,  
McCombs School of Business  
University of Texas at Austin  
1 University Station Stop B6700  
Austin, TX 78712  
Phone: 512-471-5423  
Fax: 512-471-1034  
Email: susan.broniarczyk@mccombs.utexas.edu.

J. Jeffrey Inman  
Albert Wesley Frey Professor of Marketing and Professor of Business Administration Joseph M. Katz Graduate School of Business  
University of Pittsburgh  
356 Mervis Hall  
Pittsburgh, PA 15260  
Phone: 412-648-1570  
Fax: 412-648-1659  
Email: jinman@katz.pitt.edu.

Forthcoming, Journal of Public Policy & Marketing

The authors gratefully acknowledge the financial support provided by a Rutgers University Research Council grant and a generous grant from the FINRA (formerly NASD) Investor Education Foundation (#2005-08).
Abstract

There is continuing concern that many individuals -- especially those with lower levels of financial knowledge -- are not saving enough for retirement. The authors conducted three studies to see whether simple alterations to the format of 401k plans can increase 401k plan participation rates, especially among those with low levels of knowledge about financial investing. In study 1, offering a larger number of funds for investment reduces plan participation among low knowledge investors, unless the plan also offers a target retirement date (i.e., lifecycle fund) option. In study 2, the authors find those with low knowledge are more likely to participate if the funds offered for investment are grouped by asset class, rather than listed alphabetically. In study 3, the authors find that participation increases when fund descriptions include star ratings (but not fund style boxes). The authors further find in study 3 that the star ratings increase decision satisfaction among low knowledge investors due to a reduction in perceived task difficulty. Limitations, implications, and future research are discussed.

Keywords: investor knowledge, financial literacy, information format, decision simulation, defined contribution plans, 401k plans.
Many experts believe that individuals are not saving adequately in order to have sufficient financial assets available during their retirement years. One study suggests that 10% of adults are not saving at all for retirement, with higher incidences among women (13.7%), those without a high school diploma (25.1%), Blacks and Hispanics (13.8 and 13.5% respectively), and those with household incomes below $20,000 (21.6%; Olsen and Whitman 2007). Non-participation in retirement plans may be due, in part, to the shift from traditional pensions to defined contribution plans. In recent decades, most employers have shifted from offering employees traditional pension plans to offering instead the opportunity to invest in defined contribution plans such as 401k’s. The responsibility for deciding whether and how to invest for a financially secure retirement has thus shifted to individual employees -- many of whom may not feel up to the task. According to the Bureau of Labor Statistics, over half of all workers in the U.S. had access to a defined contribution plan in 2006, and of these workers, 21% chose not to participate (http://www.bls.gov/opub/cwc/cm20061213ar01p1.htm). Inadequate retirement savings (Choi, Laibson, Madrian and Metrick 2002) is likely to take on increased importance given the government’s need to shore up the financial strength of the social security system. Thus, establishing best practices for the design of retirement savings plans, the focus of the present research, is warranted.

What accounts for suboptimal plan participation rates? As Benartzi and Thaler (2007, p. 81) point out, the shift in investment decision making responsibility from employer to employee necessitates that individual employees possess both the requisite willpower and cognitive skills to optimize the decision outcome. As Bodie and Treussard (2007, p. 1) note, 401 (k) investors typically “…do not know enough about investing to choose rationally among alternatives. Others may know enough, but find it unpleasant or too time-consuming.” Attempts to educate investors
about these topics, such as via employee seminars or benefit fairs, have generally not proven to be highly effective (Duflo and Saez 2002; Choi, Laibson, Madrian and Metrick 2002; Benartzi and Thaler 2007; cf. Bernheim and Garrett 2003).

Some techniques, such as the use of decision defaults for automatic enrollment, have successfully increased plan participation rates (e.g., Madrian and Shea 2001; see also Thaler and Benarzi 2004). However, as of 2010, only about half of private employers offered automatic enrollment, and the majority of these efforts applied only to new employees (Hess 2011). Thus, research into other ways of enhancing plan participation is needed in order to maximize the utilization of and satisfaction with employer sponsored retirement savings plans. Employers have some flexibility in how their retirement savings plans are structured. Factors such as enrollment format (automatic versus opt-in), number and type of investment options offered in the plans, matching requirements, and so forth may potentially impact whether or not an individual employee chooses to participate in the plan as well as how satisfied he or she is with their decision.

In this research, we argue that factors involving structural aspects of 401k plans that tend to reduce the perceived difficulty of the task will tend to enhance participation by low knowledge investors. We expect that alterations to 401k plan formats will enhance participation to a greater extent among low knowledge investors, as they are likely those most intimidated by the task. We report the results of three studies conducted with funding from a grant provided by the FINRA (formerly NASD) Investor Education Foundation. In these studies, participants are offered an array of mutual funds for investment, but the number, type, presentation, and descriptions are varied. In study 1 we explore the impact of the number of funds offered in the plan, as well as the presence or absence of a target retirement fund option. In study 2 we explore the effect of
listing the funds alphabetically versus grouping them by asset class. In study 3 we explore the impact of star ratings and style boxes as part of the fund descriptions. We conclude the paper with a discussion of limitations and public policy implications. We begin by discussing the factors we examine in our research.

**Investment Knowledge**

Studies have shown that many 401k plan participants, particularly “…those on the low end of the education and income distribution” are least likely to accumulate sufficient retirement funds (Viceira 2008, p. 172). Financial literacy has been found to be lower among various demographic groups, such as women, African-Americans, and Hispanics – characteristics that are linked to failure to plan for retirement as well as lack of participation in the stock market (Lusardi and Mitchell 2007).

There are numerous ways that have been suggested to measure financial literacy. Short or long “quizzes” that assess objective financial knowledge have been used. For example, Agnew, Szykman, and Utkus (2007) considered respondents who answered 6 or 7 out of seven questions correctly in a brief survey to be financially literate (e.g., True or False: “If you were to invest $1,000 in a stock mutual fund, it would be possible to have less than $1,000 when you withdraw your money.”) Unfortunately, no single agreed-upon measure of financial literacy has been established.

Other research has relied upon self-report assessments of financial knowledge. For example, Morrin, Broniarczyk, Inman, and Broussard (2008) classified high and low knowledge individuals based on their degree of agreement to the question: “Compared to most people, I know a lot about investing” (1 = Strongly Disagree to 5 = Strongly Agree). We similarly focus on self-reported financial knowledge. We expect that people with lower levels of investment
knowledge are likely those most intimidated by the prospect of having to make the decision of whether and how to invest for retirement, and thus will exhibit a lower tendency to participate in such plans. In study 1 we utilize the same single-item measure of knowledge as in Morrin, Broniarczyk, and Inman (2008). In studies 2 and 3 we expand the measure to a three-item scale.

**Fund Assortment Size**

Huberman and colleagues (Huberman, Iyengar and Jiang 2007; Huberman and Jiang 2006) examined data provided by Vanguard on over 700,000 participants in 401k plans to explore the effect of increasing the number of available mutual funds on aggregate-level plan participation rates. They found that for every 10 additional funds added to an assortment, the participation rate in the plan dropped by 1.5% to 2%. For example, when only two funds were offered in a plan, the average participation rate was 75%, but when there were 59 funds offered in a plan, the participation rate dropped to 60%. Agnew and Szykman (2005) showed how increasing the number of investment options in retirement plans creates feelings of information overload, especially among those with below average levels of investment knowledge. Thus, we would expect that low knowledge investors are more susceptible to the negative effects of increasing fund assortment sizes. We test this in study 1 as well as a potential method for combating such effects – a target fund option.

**Target Fund**

Some researchers have suggested a potential solution to the potentially negative effects of larger fund assortments offered in defined contribution plans is to offer investors a target retirement date fund (or target fund or lifecycle fund) to help simplify the employee’s investment decision task. In 2008, target funds accounted for $184.2 billion in assets, for an increase of 43% versus the previous year.
A target fund automatically allocates the dollars across asset classes (such as stock, bond and money market funds) and rebalances the portfolio toward a more conservative profile as the individual nears retirement age. A target fund requires only that the investor determine the year of their retirement and the amount of money they want to invest. Investing in such funds, which are sometimes referred to as one-stop-shopping funds, is also referred to as putting one’s retirement investment on “autopilot” as it requires minimal effort from the decision maker. At present, little is known about the effect of such funds on investor behavior. We expect that the option to invest in a target fund will offset the deleterious effect of increased fund assortment on participation rates in 401k plans.

**Fund Partitioning**

Research has shown that individuals’ decisions can vary systematically based on how the option set is subjectively grouped or partitioned (Fox and Rottenstreich 2003; Fox, Ratner, and Lieb 2005). Langer and Fox found that partitioning investment funds by vendor systematically affected investor fund allocations, with investors inclined to equally distribute their allocations among fund vendors. In study 2, we explore the effect of categorizing the funds by asset class (versus listing them alphabetically) and thus perceptually partitioning them into a smaller number of easily identifiable sets. Alphabetical and asset-class partitioned fund listings are two commonly available formats at major fund family websites. We effectively change the choice space from a larger number of mutual funds to a set of two asset classes, which should represent a cognitively less demanding way to process and interpret the fund information.

In one of their studies, Fox, Ratner, and Lieb (2005, study 5) found stronger partition dependence among novices than experts. They argue that when choosing from among several...
options, novices (versus experts) are less likely to have innate preferences, are less able to
distinguish among options, and therefore are less likely to exhibit consistent choices among
different descriptions of options (e.g., partitioned versus non-partitioned options). In contrast,
experts who have "greater relevant experience discriminating among options" were shown to be
significantly less likely to exhibit partition dependence. Similar attenuation of partitioning effects
are found for decision makers who are more confident (See, Fox and Rottenstreich 2006).

We therefore expect that low knowledge investors will benefit more from a partitioned
choice set. It may be more difficult for low investors to process the fund alternatives when
choosing from alphabetical fund assortments because they lack the ability to differentiate the
funds, or perceive them at a more abstract, or higher-level grouping, such as by asset class.
Presenting funds alphabetically to such investors may obscure such meaningful groupings and
make the task seem overwhelming.

**Fund Information**

We explore the effects of two types of supplementary fund information commonly
available from fund information firm Morningstar, Inc: star ratings and style boxes.\(^1\) The stars
are based on the rankings of similar types of funds in terms of historical risk and return. The star
rating evaluates each mutual fund on the basis of return relative to risk compared to other mutual
funds within its specific fund category (e.g., a large cap growth fund's performance is compared
to that of other large cap growth funds over a given time period, such as 3 years). Each fund is
given from 1 to 5 stars, based on how it has performed relative to its peers (there are 48 such
categories used by Morningstar;

\(^1\) It is important to note that in this paper we do not take a position regarding whether or not investors
should rely on Morningstar star ratings or style boxes when making investment decisions. Indeed, some studies have
questioned the extent to which the stars possess predictive validity (Blake and Morey 2000). Our interest here lies in
exploring their impact on plan participation and decision satisfaction levels.
http://datalab.morningstar.com/Midas/PDFs/Research_StarRating.pdf). For example, a fund receives a 1-star rating if its risk-adjusted performance puts it in the bottom 10% of funds within its category, and a 5-star rating if its risk-adjusted performance puts it in the top 10% of funds within its category. According to the Morningstar web site (http://news.morningstar.com/article/article.asp?id=77455&_QSBPA=Y), the star ratings are designed to help investors "narrow a crowded mutual fund field down to a more manageable size" and thus "prove to be valuable time savers that will help you navigate your way through an enormous universe of choices."

We conceptualize the Morningstar star rating as an evaluative decision aid that largely communicates fund desirability (figure 1a). As such, the star rating may reduce the perceived difficulty associated with the decision task by quickly and clearly indicating which funds are more desirable and thus should enter the investor’s consideration set. The star rating can help to quickly narrow down the set of alternatives to a smaller and more cognitively manageable set of to be given further consideration. The star rating system is also likely easy to interpret and use, since consumers may have encountered similar rating systems in other choice contexts (e.g., movie ratings etc.).

The Morningstar style box is primarily an informative type of decision aid, because it provides classificatory input for the decision maker. The Morningstar style box (figure 1b) was designed to provide a "snapshot" summary of a mutual fund's investing style to help investors
adequately diversify their holdings. The style box, according to Morningstar's website, is designed to ensure adequate diversification among an investor's funds (http://news.morningstar.com/article/article.asp?id=13564&_QSBPA=Y). Use of the style box ideally should aid the investor in building a portfolio that represents a variety of securities across asset classes and investing styles that is better able to weather the vicissitudes of market swings.

Each fund is classified into one of nine boxes within a style box. An investor can use a fund's classification as an input during the choice process to enable the investor to include a wide variety of styles of funds in their investment portfolio to ensure diversification (i.e., include funds that are classified into different locations within the style box). A nine-box matrix classifies stock funds on the basis of two dimensions: whether the fund tends to invest in small, medium, or large capitalization firms, and whether the fund tends to invest in growth, blend, or value type stocks. A similar 3 X 3 matrix classifies bond funds along two dimensions: credit quality (low, medium, high) and maturity (short-, intermediate-, or long-term investments).

The style box does not provide evaluative input to the decision maker, however, as no type of investment style is necessarily better or worse than another -- a large cap fund is not necessarily better or worse than a small cap or mid cap; a growth-oriented stock fund is not necessarily better or worse than a value-oriented one. Thus, the Morningstar style box provides information to allow the decision maker to compare and contrast funds in terms of investment style, but it does not provide any type of evaluative input for the investor in terms of indicating whether or not a particular fund should be chosen or even considered for investment. Consequently, as the Morningstar style box does not indicate which styles should be included in one’s portfolio or how many styles to choose, we expect it will not have the same decision easing
property as the star ratings. Further, we see what the joint effect of including both types of information (both rating stars and style boxes) will have on investor behavior.

Next, we report the results of three studies that explore the effects of fund assortment (study 1), fund partitioning (study 2), and fund information (study 3) on plan participation.

**Study 1: Fund Assortment**

In this study we manipulate the number of funds offered for investment (nine versus twenty-one funds) as well as whether or not the investor is given the option to invest in a target retirement fund. We expected that a larger fund assortment would reduce participation among low knowledge investors, but that this effect would be attenuated if they were also offered the option to instead invest in a target retirement fund.

**Method**

**Sample**

The respondents consisted of 335 individuals recruited in a university campus center. The majority of participants (68.6%) were under the age of 30. About half were male (51.6%). They were offered a small cash payment to complete a paper and pencil survey on retirement investing.

**Design**

Respondents were randomly assigned to one of the four conditions in a 2 (assortment size) x 2 (target fund) design. In this study we manipulated the number of mutual funds offered for investment in a 401k plan (9 versus 21 funds) as well as whether the investor was offered a target fund (yes, no). In the smaller [larger] fund assortment condition, investors could choose from three [seven] stock funds, three [seven] bond funds, and three [seven] money market funds (see Appendix A). In the conditions that included a target retirement fund, investors could either
choose which funds to invest in from the regular fund assortment, or they could choose to invest in a target retirement fund. On the page following the page(s) describing the fund assortment, respondents in the target retirement fund condition had the target fund described to them in a table (see Appendix B) after reading the following:

*If you would like to participate in your employer’s 401k plan but you would rather not decide how to allocate your dollars among the various mutual funds offered for investment, you can choose to invest your money in what is known as a target retirement fund.*

*This fund starts with an appropriate mix of stocks and bonds based on the number of years until you retire. The asset mix then gradually and automatically becomes more conservative over time, as your retirement date nears.*

**Procedure**

This study was conducted via paper and pencil surveys distributed in a campus center. After the investment decision was completed, respondents answered a small number of questions on 5-point Likert items (from 1 = Strongly Disagree to 5 = Strongly Agree) and provided demographic information.

**Measures**

Knowledge. We measured investor knowledge with agreement to a single item (modeled after Morrin, Broniarczyk, and Inman 2008): “Compared to most people, I know a lot about investing” (from 1 = Completely Disagree to 5 = Completely Agree). In this and the subsequent studies, we analyze the results with a continuous measure of investor knowledge, and report results based on median splits for expository purposes.

**Results**

Participation
Of the 335 respondents who completed the survey, 258 or 77.0% chose to participate in the plan. We conducted a logistic regression on plan participation as a function of fund assortment size (small, large), target fund option (yes, no), investor knowledge (measured on a continuous scale), and all possible interactions. Knowledge was significant (Wald(1) = 4.85, \( p < .05 \)), the interaction between knowledge and assortment was significant (Wald(1) = 5.48, \( p < .05 \)), and the three-way interaction between knowledge, assortment, and inclusion of a target fund was significant (Wald(1) = 4.01, \( p < .05 \)). Inspection of the means shows that when choosing from a large fund assortment, low knowledge investors are less likely to invest in the plan than are high knowledge investors (Proportion_{LowKnowledge} = 65.9\% vs. Proportion_{HighKnowledge} = 88.6\%, \( p < .05 \)). Inclusion of a target date fund eliminates the difference in participation rate between low and high knowledge investors (Proportion_{LowKnowledge} = 80.4\% vs. Proportion_{HighKnowledge} = 78.0\%, \( p > .75 \); see table 1 for cell means).

Target Fund

We then examined the decision to invest in the target fund (or not) among the 146 plan participants offered that option. The proportion of low and high knowledge participants investing in the target fund did not differ significantly when choosing from a small fund assortment (Proportion_{LowKnowledge} = 64.7\% vs. Proportion_{HighKnowledge} = 46.2\%, \( \chi^2(1) = 2.52, p > .10 \)); however when choosing from the large fund assortment, the difference was significant, with low knowledge investors more likely to invest in the target fund (Proportion_{LowKnowledge} = 68.3\% vs. Proportion_{HighKnowledge} = 43.8\%, \( \chi^2(1) = 4.43, p < .05 \)). Thus, in the context of the more
demanding investment task, those with less investment knowledge were more likely to opt for the target fund.

**Discussion**

In this study we found that a larger fund assortment reduced plan participation only among low knowledge investors, thus extending the work of prior research (e.g., Huberman and Jiang 2006), which had found lower participation rates at an aggregate level. Moreover, we found that offering investors a target retirement date option tended to offset the negative effect of a larger assortment on participation. The results suggest a potential solution to policy makers interested in maintaining choice options while minimizing the negative consequences on participation rates.

**Study 2: Fund Partitioning**

In this study we manipulate whether mutual funds in a 401k plan are listed alphabetically or are grouped (i.e., partitioned) by asset class. At mutual fund websites, investors often have the option of viewing the funds alphabetically or by asset class (e.g., bond funds, stock funds, money market funds). Half the sample in our study viewed the fund list with the bond funds grouped together, and the stock funds grouped together (partitioned); the other half viewed the funds in an alphabetical order, with the stock and bond funds mixed together. We expected that less knowledgeable investors would be more likely to participate in the plan when choosing from a partitioned (versus alphabetical) fund listing.

**Method**

*Sample*

A nationally representative sample of U.S. households was obtained from a list seller for a mailing to 3,000 households. A dollar bill was enclosed in each envelope that contained the
survey to encourage response; 112 responses were received (see table 2 for demographic characteristics).

Design

In this study we manipulated whether or not the set of mutual funds offered for investment was partitioned by asset class (yes, no). Each respondent could choose from exactly ten different mutual funds for investment in the 401k plan: five stock funds and five bond funds (see Appendix C). Half the respondents received the fund list with the bond funds and stock funds grouped separately (partitioned condition), whereas the other half received the funds listed in an alphabetical order (control condition).

Procedure

The procedure was similar to that of study 1 except that this study was conducted by mail. After the investment decision was completed on the paper and pencil survey, respondents answered a small number of questions on 5-point Likert items (from 1 = Strongly Disagree to 5 = Strongly Agree) and provided demographic information.

Measures

Knowledge. We measured self-reported investment knowledge with a scale consisting of three items to which respondents indicated their degree of agreement (from 1 = Strongly Disagree to 5 = Strongly Agree): “Compared to most people, I know a lot about investing,” “Others often ask me for investing advice,” and “I feel very confident in my investing abilities” (coefficient alpha = .81).
Results

Participation

Of the 112 respondents who mailed back a completed survey, 83.9% indicated they would participate in the 401k plan (n = 94). We conducted a logistic regression on plan participation as a function of fund partitioning (yes, no), knowledge (measured continuously) and their interaction. Fund partitioning was significant (B = 2.08, Wald(1) = 5.12, \( p < .05 \)), knowledge was directionally significant (B = .786, Wald(1) = 3.82, \( p < .10 \)), and the interaction between these two variables was significant (B = -.87, Wald(1) = 4.66, \( p < .05 \)). Low knowledge investors were less likely than high knowledge investors to participate in the 401k plan when the funds were listed alphabetically (Proportion\(_{LowKnowledge} = 67.7\% \) versus Proportion\(_{HighKnowledge} = 100.0\% \), \( \chi^2(1) = 6.93, p < .01 \)). Conversely, there was no difference in participation rate when the funds were partitioned by asset class (Proportion\(_{LowKnowledge} = 87.5\% \) versus Proportion\(_{HighKnowledge} = 82.9\% \), \( \chi^2(1) = .28, p > .55 \)).

Discussion

In this study we found that presenting the list of funds offered for investment in a grouped or partitioned format (i.e., by asset class) increased plan participation among low knowledge investors. The results of this study thus offer another option to enhance plan participation among lower knowledge investors for fiduciaries and employers responsible for developing the format of 401k plans offered to employees.

Study 3: Fund Information

In study 3 we explore the impact on plan participation of two commonly available fund descriptors: star ratings and style boxes. We expect that the stars will increase participation, unless accompanied by style boxes. Providing both types of information may be
counterproductive as it may produce information overload effects, etc. We also explore the
moderating effect of investor knowledge on decision satisfaction, and the mediating role of
perceived task difficulty.

Method

Sample

Respondents for study 3 were obtained by conducting an on-line study among consumer
panelists from a commercial market research firm. Of 2,058 panelists who began the survey, 641
completed it, indicating they would participate in the 401k plan (see table 2).

Design

In this study, all participants were presented with an alphabetical list of 15 mutual funds
from which they could choose: 10 stock funds and 5 bond funds (see Appendix D). We
manipulated the presence or absence of star ratings and style boxes. Respondents were randomly
assigned to one of four conditions created by the 2 (stars: yes, no) x 2 (style boxes: yes, no) full
factorial design. Note that we do not suggest that we are controlling for precisely the same
amount or degree of importance of fund information across the conditions. Instead, we are
simply testing the impact of adding (versus not) star ratings and/or style boxes to the commonly
available verbal descriptions of mutual funds typically offered for investment. This approach was
designed in order to mimic the real-world decision a fiduciary might face, in terms of whether or
not to add star ratings and/or style boxes to written fund descriptions.

Procedure

The procedure in this study mirrored that of study 2. Here, however, the funds either did
or did not include Morningstar star ratings and style boxes.

Measures
Knowledge. We measured self-reported investment knowledge with the same three-item scale used in study 2 (coefficient alpha = .90).

Satisfaction. We measured decision with a scale consisting of three items to which respondents indicated their degree of agreement (from 1 = Strongly Disagree to 5 = Strongly Agree): “I am very happy with the decision I made” and “I am very satisfied with my decision” and “I feel confident I made a good decision” (coefficient alpha = .95).

Task Difficulty. Perceived task difficulty was measured with two items to which respondents indicated their degree of agreement (from 1 = Strongly Disagree to 5 = Strongly Agree): “This decision was difficult to make,” and “I found it hard to allocate my investment across funds” (coefficient alpha = .82).

Results

Participation

We conducted a logistic regression on plan participation (yes, no) as a function of the presence or absence of star ratings, style boxes, and their interaction [Note: Because investor knowledge was measured only among those who completed the survey, not among those who did not complete the survey, it cannot be used in the analysis of participation]. Significant effects emerge for star ratings (B = .26, Wald(1) = 4.32, p < .05), style boxes (B = -.41, Wald(1) = 11.45, p < .01), and their interaction (B = -.63, Wald(1) = 8.87, p < .01). Inspection of the means shows that, when there were no style boxes in the fund descriptions, the presence of star ratings increased the participation rate (ProportionNoStars = 34.8\% vs. ProportionStars = 40.9\%, $\chi^2(1) = 4.33, p < .05$). But when the style boxes were present, adding star ratings reduced the participation rate (ProportionNoStars = 26.1\% vs. ProportionStars = 19.7\%, $\chi^2(1) = 4.72, p < .05$). This pattern of results suggests that stars, by themselves, encourage participation, but together
with style boxes may cause information overload (we explore this notion further in terms of task
difficulty). Thus, the lowest level of participation resulted when both the star ratings and the
style boxes were present, suggesting that adding more decisions aids may eventually create a
state of information overload that is counterproductive.

We next analyzed the responses of the 641 respondents who chose to participate in the
401k plan. Unless otherwise indicated, we conducted regression analyses as a function of star
ratings (yes, no), style boxes (yes, no), investor knowledge (measured on a continuous scale),
and all possible interactions.

**Satisfaction**

In a regression on decision satisfaction, the presence of stars ($t = 2.96, p < .01$), investor
knowledge ($t = 6.43, p < .01$), and the interaction between these two variables ($t = -2.64, p < .01$)
are significant. Inspection of the means shows that the presence of the star ratings significantly
increased decision satisfaction among those low in investment knowledge ($M_{NoStars} = 3.49$ versus
$M_{Stars} = 3.87, p < .01$) but not among those high in investment knowledge ($M_{NoStars} = 4.07$ versus
$M_{Stars} = 4.11, p > .70$). The style boxes had no significant impact on decision satisfaction as
either a main or interactive effect (all $p$’s > .15).

**Task Difficulty**

In a regression on perceived task difficulty, the presence of the stars ($t = -3.57, p < .01$),
investor knowledge ($t = -6.41, p < .01$), and the interaction between these two variables ($t = 2.89,
p < .01$) are significant. Among those with low knowledge, the task was perceived as less
difficult when there were stars present ($M_{NoStars} = 3.16$ vs. $M_{Stars} = 2.87, p < .10$); this result did
not emerge among those with high knowledge ($M_{NoStars} = 2.54$ vs. $M_{Stars} = 2.67, p > .30$). The
style boxes had no significant impact on task difficulty as either a main or interactive effect (all
p’s > .10).

Mediation Analysis

We conducted a mediation analysis with a series of regressions using mean-centered
variables to see if the star ratings increased decision satisfaction among low knowledge investors
because of the stars’ effect on perceived task difficulty (Baron and Kenny 1986; see table 3). In
the first regression we confirmed that rating stars (the independent variable) predicted decision
satisfaction (the dependent variable) more for low knowledge investors, as evidenced by a
significant stars by knowledge interaction (t = -2.53, p < .05). In the second regression we
confirmed that rating stars predicted decision difficulty (the mediator) more for low knowledge
investors, as evidenced by a significant stars by knowledge interaction (t = 3.36, p < .01). In the
third regression, we confirmed that decision difficulty (the mediator) predicted decision
satisfaction (t = -7.64, p < .01), whereas the effect of rating stars (the independent variable; t =
1.82, p > .05) and the interaction between rating stars and knowledge (t = -1.56, p > .10) were no
longer significant, suggesting full mediation. A Sobel test (1982) of the indirect effect was
significant (z = 2.61, p < .01). Since entering the mediator of decision difficulty rendered the
interaction between knowledge and rating stars insignificant, the results support a mediated
moderation explanation (Muller, Judd and Yzerbyt 2005).²

² We also used a nonparametric bootstrapped estimation of the indirect effect to test mediation
(Preacher and Hayes 2004). The bootstrap estimate of the indirect effect was -.0618, and the
estimated 95% bias corrected and accelerated confidence interval around this estimate did not
contain zero (-.1140 to -.0206), suggesting the indirect effect is significantly different from zero,
in support of mediation. Thus, the nonparametric test also shows that rating stars improve
decision satisfaction for low knowledge investors because of their ability to reduce perceived
decision difficulty.
Discussion

In this study we found that the presence of the rating stars, but not style boxes, increased decision satisfaction among low knowledge investors and that this result was driven by a reduction in perceived task difficulty. The results thus offer another possible solution to easing the decision task, enhancing satisfaction, and potentially increasing participation among those with lower levels of investment knowledge.

General Discussion

Despite the development of state mandates to increase financial literacy levels (Walstad, Rebeck, and MacDonald 2010), formal efforts to educate individuals about personal finance and investing have often resulted in disappointing outcomes. Mandell (2008), for example, examined data from 2000 to 2006 and found no evidence that students who had taken a money management or personal finance course knew any more about the topic of personal finance than those who had not. Hathaway and Khatiwada (2008, p .19), in a comprehensive and critical analysis of research investigating the impact of financial education programs concluded: “Unfortunately, we do not find conclusive evidence that, in general, financial education programs do lead to greater financial knowledge, and, ultimately, to better financial behavior.”

A degree of consensus has emerged among many researchers in the area of financial literacy that effective strategies to educate individuals about personal finance and investing have yet to emerge (McCormick 2009).

Thus, the more effective and more immediate approach to enhancing consumer welfare as regards retirement investing may be to focus on changing the plans themselves rather than on
changing or educating the investors. In this sense, our work is in agreement with the growing body of literature regarding choice architecture, which explores how relatively simple alterations to decision contexts can “nudge” individuals toward making better decisions regarding their health, wealth, and well-being (Thaler and Sunstein 2009). Such efforts are evident not only in the domain of financial investing but across a variety of choice contexts. For example, the Food and Drug Administration is considering adding star ratings to front-of-package food labels to indicate how healthy packaged foods are, to aid consumers in their in-store choices to combat the obesity epidemic (Dorning 2010).

The results here suggest that retirement plan formats, if developed with conscious consideration of the degree to which they ease the cognitive burden associated with the task, provide considerable promise in terms of both applicability and impact. Of course our results are limited in that they are based on decision simulations, and thus need to be verified in actual plan settings. Moreover, we were not able to measure the effect of the respondents’ other investments or the effects on measures other than participation, such as dollars invested or degree of diversification. Ideally, future research would measure investments outside of defined contribution plans to control for differences in risk and return objectives. And there are certainly other plan format options that likely have similar or even greater effects on plan participation, and we would encourage plan developers and fiduciaries to explore such options. The overarching goal is to develop plan formats that make the decision task easier for those with lower levels of investment knowledge so that they feel less intimidated. Such efforts should enhance both participation as well as employee satisfaction with the plan offering.

References


Federal Reserve Bank of Cleveland Working Paper No. 08-03 (accessed July 25, 2011),

From the Private Sector,” Aon Hewitt analysis,(accessed July 25, 2011), [available at
ink%3Ffid%3D47386+participation+rate+in+defined+contribution+plans&hl=en&gl=us&pid=bl
&srcid=ADGEEShZCeMKT-xiLNSVM8mQTCeG8UdWeMnpeCK6lmh4XQcNUhptlZF-
cJvt6g2oTFeEQ51LssOvNtmJIdmC1Dlhk98HeRrjPU9n0gUSbvUHUAYD-z88Y-
Y45B3jg489A6EnsiZWFD&sig=AHIEtbSRm3dfp5Q4w1ex7o9hl7BDblISEQ].

31(1), 1-32.

and Number of Funds, *Journal of Finance*, 61 (2), 763-801.


TABLE 1

STUDY 1 MEAN PARTICIPATION RATES

<table>
<thead>
<tr>
<th></th>
<th>Small Fund Assortment</th>
<th>Large Fund Assortment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Knowledge</td>
<td>High Knowledge</td>
</tr>
<tr>
<td>No Target Fund</td>
<td>80.6%</td>
<td>65.8%</td>
</tr>
<tr>
<td>Target Fund</td>
<td>79.1%</td>
<td>78.0%</td>
</tr>
</tbody>
</table>

Note: Investors categorized on knowledge with a median split.

STUDY 2 MEAN PARTICIPATION RATES

<table>
<thead>
<tr>
<th></th>
<th>Low Knowledge</th>
<th>High Knowledge</th>
<th>( \chi^2 ) test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alphabetical Fund List</td>
<td>67.7%</td>
<td>100.0%</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>Partitioned Fund List</td>
<td>87.5%</td>
<td>82.9%</td>
<td>.59</td>
<td></td>
</tr>
</tbody>
</table>

Note: Investors categorized on knowledge with a median split.

STUDY 3 MEAN PARTICIPATION RATES

<table>
<thead>
<tr>
<th></th>
<th>No Stars</th>
<th>Stars</th>
<th>( \chi^2 ) test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Style boxes</td>
<td>34.8%</td>
<td>40.9%</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>Style boxes</td>
<td>26.1%</td>
<td>19.7%</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>Demographic Characteristics of Respondents in Studies 2 and 3</td>
<td>Study 2 (national mailing) n=112</td>
<td>Study 3 (online consumer panel) n=641</td>
<td>Adult U.S. Population</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 25</td>
<td>0.9%</td>
<td>5.6%</td>
<td>17.7%</td>
<td></td>
</tr>
<tr>
<td>25 to 34</td>
<td>13.4%</td>
<td>16.6%</td>
<td>18.0%</td>
<td></td>
</tr>
<tr>
<td>35 to 44</td>
<td>24.1%</td>
<td>24.0%</td>
<td>20.4%</td>
<td></td>
</tr>
<tr>
<td>45 to 54</td>
<td>25.9%</td>
<td>32.0%</td>
<td>17.1%</td>
<td></td>
</tr>
<tr>
<td>55 to 64</td>
<td>24.1%</td>
<td>18.0%</td>
<td>11.0%</td>
<td></td>
</tr>
<tr>
<td>65+</td>
<td>11.6%</td>
<td>3.8%</td>
<td>15.7%</td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>71.4%</td>
<td>34.6%</td>
<td>49.0%</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>28.6%</td>
<td>65.4%</td>
<td>50.9%</td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some or all grade school</td>
<td>0.0%</td>
<td>1.2%</td>
<td>14.5%</td>
<td></td>
</tr>
<tr>
<td>Some or all high school</td>
<td>15.2%</td>
<td>21.0%</td>
<td>31.7%</td>
<td></td>
</tr>
<tr>
<td>Some or all college</td>
<td>50.9%</td>
<td>61.7%</td>
<td>44.0%</td>
<td></td>
</tr>
<tr>
<td>Some or all grad school</td>
<td>33.9%</td>
<td>16.1%</td>
<td>9.7%</td>
<td></td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never married</td>
<td>16.1%</td>
<td>25.2%</td>
<td>27.1%</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>66.1%</td>
<td>54.2%</td>
<td>54.4%</td>
<td></td>
</tr>
<tr>
<td>Divorced/separated/widowed</td>
<td>17.9%</td>
<td>20.6%</td>
<td>18.5%</td>
<td></td>
</tr>
<tr>
<td><strong>Household income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0 to $25,000</td>
<td>7.5%</td>
<td>22.0%</td>
<td>25.7%</td>
<td></td>
</tr>
<tr>
<td>$25,001 to $50,000</td>
<td>18.9%</td>
<td>36.3%</td>
<td>26.5%</td>
<td></td>
</tr>
<tr>
<td>$50,001 to $75,000</td>
<td>31.1%</td>
<td>22.0%</td>
<td>18.7%</td>
<td></td>
</tr>
<tr>
<td>$75,001 to $100,000</td>
<td>17.9%</td>
<td>9.3%</td>
<td>11.9%</td>
<td></td>
</tr>
<tr>
<td>$100,001+</td>
<td>24.5%</td>
<td>10.4%</td>
<td>17.2%</td>
<td></td>
</tr>
<tr>
<td><strong>Number of Children in Household</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>51.8%</td>
<td>53.6%</td>
<td>52.0%</td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>16.1%</td>
<td>18.5%</td>
<td>20.0%</td>
<td></td>
</tr>
<tr>
<td>Two or more</td>
<td>32.1%</td>
<td>27.9%</td>
<td>28.0%</td>
<td></td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>7.1%</td>
<td>9.0%</td>
<td>12.2%</td>
<td></td>
</tr>
<tr>
<td>Asian-American</td>
<td>2.7%</td>
<td>3.2%</td>
<td>3.7%</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>84.8%</td>
<td>79.8%</td>
<td>69.4%</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>3.6%</td>
<td>3.0%</td>
<td>12.4%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1.8%</td>
<td>5.1%</td>
<td>2.3%</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 3.
Regression Results for Mediation Analysis in Study 3

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Criterion = Decision Satisfaction</th>
<th>Criterion = Decision Difficulty</th>
<th>Criterion = Decision Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$b$</td>
<td>$t$</td>
<td>$b$</td>
</tr>
<tr>
<td>Stars (IV)</td>
<td>.144</td>
<td>2.06*</td>
<td>.090</td>
</tr>
<tr>
<td>Know (MOD)</td>
<td>.316</td>
<td>8.20**</td>
<td>-.350</td>
</tr>
<tr>
<td>Stars X Know (IV X MOD)</td>
<td>-.158</td>
<td>2.53*</td>
<td>.268</td>
</tr>
<tr>
<td>Dec Diff (MED)</td>
<td></td>
<td></td>
<td>-.240</td>
</tr>
<tr>
<td>Dec Diff X Know (MED X MOD)</td>
<td></td>
<td></td>
<td>.001</td>
</tr>
</tbody>
</table>

Stars = rating stars; Know = investor knowledge; Dec Diff = decision difficulty; IV = independent variable; MOD = moderator; MED = mediator. *p < .05. ** p < .01.
FIGURE 1A.
MORNINGSTAR STAR RATING (EXAMPLE OF 5-STAR FUND)

★★★★★

FIGURE 1B.
MORNINGSTAR STYLE BOX (EXAMPLE OF LARGE-CAP, BLEND FUND)
# APPENDIX A
## STUDY 1 FUND DESCRIPTIONS

9 Fund Assortment:

<table>
<thead>
<tr>
<th>Fund Name</th>
<th>Fund Objective</th>
<th>Average Annual Total Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 Index Stock Fund</td>
<td>The fund seeks to track the performance of a benchmark index that measures the investment return of large-capitalization stocks.</td>
<td>20.6% -10.2% 10.4%</td>
</tr>
<tr>
<td>Explorer Stock Fund</td>
<td>Seeks long-term capital growth by investing primarily in the stocks of smaller companies. This fund's advisers use both fundamental (company, industry, and economic research) and quantitative (computer modeling) analysis to select stocks that have significant growth potential based on the advisers' judgments about companies' financial prospects.</td>
<td>41.6% -3.2% 10.8%</td>
</tr>
<tr>
<td>Federal Money Market Fund</td>
<td>Invests primarily in short-term securities that are issued by U.S. government agencies.</td>
<td>1.0% 2.7% 4.4%</td>
</tr>
<tr>
<td>GNMA Bond Fund</td>
<td>Seeks current income by investing primarily in Government National Mortgage Association (&quot;Ginnie Mae&quot;) securities, which are backed by the U.S. government to provide timely payment of principal and interest (yield and share price are not guaranteed).</td>
<td>2.7% 7.7% 6.8%</td>
</tr>
<tr>
<td>International Growth Stock Fund</td>
<td>Seeks long-term capital growth by investing in the stocks of foreign companies believed by its investment advisers to exhibit above-average growth potential. To maintain geographic diversity, the fund's advisers invest in a number of international stock markets; most investments are made in Europe and in the Pacific region. To discourage short-term trading, the fund assesses a 2.0% fee on redemptions of shares purchased on or after June 27, 2003, and held less than two months. The fee is paid directly to the fund and therefore is not considered a load.</td>
<td>25.1% -8.2% 5.2%</td>
</tr>
<tr>
<td>Long-Term Corporate Bond Fund</td>
<td>Seeks current income by investing primarily in high-quality corporate bonds with an average maturity of 15 to 25 years. The fund's expense advantage allows it to pursue a higher level of income with less risk than comparable funds.</td>
<td>9.8% 11.4% 7.3%</td>
</tr>
<tr>
<td>Prime Money Market Fund</td>
<td>Invests in a combination of commercial paper, certificates of deposit, bankers' acceptances, and U.S. government securities. This fund typically offers the highest yield of our money market funds.</td>
<td>1.0% 2.7% 4.4%</td>
</tr>
<tr>
<td>Short-Term Corporate</td>
<td>Seeks current income by investing primarily in high-quality corporate bonds with an average maturity of 1 to 3 years.</td>
<td>5.2% 6.6% 5.9%</td>
</tr>
<tr>
<td>Bond Fund</td>
<td>This fund's expense advantage allows it to pursue a higher level of income with less risk than comparable funds.</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>---------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Tax-Exempt Money Market Fund</td>
<td>Invests in high-quality municipal securities issued by state and local governments across the U.S. This fund provides income that is exempt from federal tax.</td>
<td>1.0%</td>
</tr>
</tbody>
</table>
### 21 Fund Assortment:

<table>
<thead>
<tr>
<th>Fund Name</th>
<th>Fund Objective</th>
<th>Average Annual Total Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 Index Stock Fund</td>
<td>The fund seeks to track the performance of a benchmark index that measures the investment return of large-capitalization stocks.</td>
<td>20.6%  -10.2%  10.4%</td>
</tr>
<tr>
<td>Admiral Treasury Money Market Fund</td>
<td>Invests solely in direct government obligations, such as U.S. Treasury bills and other short-term securities backed by the full faith and credit of the U.S. government. This fund's expenses are low because of its high minimum investment.</td>
<td>1.1%  2.7%  4.3%</td>
</tr>
<tr>
<td>Explorer Stock Fund</td>
<td>Seeks long-term capital growth by investing primarily in the stocks of smaller companies. This fund's advisers use both fundamental (company, industry, and economic research) and quantitative (computer modeling) analysis to select stocks that have significant growth potential based on the advisers' judgments about companies' financial prospects.</td>
<td>41.6%  -3.2%  10.8%</td>
</tr>
<tr>
<td>Federal Money Market Fund</td>
<td>Invests primarily in short-term securities that are issued by U.S. government agencies.</td>
<td>1.0%  2.7%  4.4%</td>
</tr>
<tr>
<td>GNMA Bond Fund</td>
<td>Seeks current income by investing primarily in Government National Mortgage Association (&quot;Ginnie Mae&quot;) securities, which are backed by the U.S. government to provide timely payment of principal and interest (yield and share price are not guaranteed).</td>
<td>2.7%  7.7%  6.8%</td>
</tr>
<tr>
<td>Growth Equity Stock Fund</td>
<td>Seeks long-term capital growth by investing in the stocks of midsize and large companies with strong earnings prospects, and selling those whose earnings prospects are deteriorating. This fund's adviser evaluates these earnings prospects through a blend of computer-driven and fundamental (company, industry, and economic) analysis.</td>
<td>28.6%  -23.6%  7.4%</td>
</tr>
<tr>
<td>Health Care Stock Fund</td>
<td>Seeks long-term capital growth by investing in U.S. and foreign companies that develop, produce, or distribute products and services related to health care. These include pharmaceutical firms, medical supply companies, companies that operate health care facilities, and companies engaged in research. To discourage short-term trading, the fund assesses a 1% redemption fee on shares held less than five years.</td>
<td>16.0%  0.6%  19.6%</td>
</tr>
<tr>
<td>High-Yield Tax-Exempt Bond Fund</td>
<td>Seeks high current income exempt from federal tax by investing primarily in medium-quality municipal securities with an average maturity of 15 to 25 years. This</td>
<td>6.6%  7.0%  5.7%</td>
</tr>
<tr>
<td>Fund</td>
<td>Description</td>
<td>Performance</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>International Growth Stock Fund</strong></td>
<td>Seeks long-term capital growth by investing in the stocks of foreign companies believed by its investment advisers to exhibit above-average growth potential. To maintain geographic diversity, the fund's advisers invest in a number of international stock markets; most investments are made in Europe and in the Pacific region. To discourage short-term trading, the fund assesses a 2.0% fee on redemptions of shares purchased on or after June 27, 2003, and held less than two months. The fee is paid directly to the fund and therefore is not considered a load.</td>
<td>25.1%</td>
</tr>
<tr>
<td>Fund Name</td>
<td>Fund Objective</td>
<td>Average Annual Total Returns</td>
</tr>
<tr>
<td>----------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Intermediate-Term Bond Index Fund</td>
<td>Seeks to track the performance of a market-weighted bond index with an intermediate-term dollar-weighted average value.</td>
<td>7.5% 10.4% ---</td>
</tr>
<tr>
<td>Long-Term Corporate Bond Fund</td>
<td>Seeks current income by investing primarily in high-quality corporate bonds with an average maturity of 15 to 25 years. The fund's expense advantage allows it to pursue a higher level of income with less risk than comparable funds.</td>
<td>9.8% 11.4% 7.3%</td>
</tr>
<tr>
<td>NJ Tax-Exempt Money Market Fund</td>
<td>Invests primarily in high-quality New Jersey municipal money market securities. This fund provides income that is exempt from both federal and New Jersey personal income taxes.</td>
<td>0.9% 1.8% 2.7%</td>
</tr>
<tr>
<td>PA Tax-Exempt Money Market Fund</td>
<td>Invests primarily in high-quality Pennsylvania municipal money market securities. This fund provides income that is exempt from both federal and Pennsylvania personal income taxes.</td>
<td>0.9% 1.9% 2.9%</td>
</tr>
<tr>
<td>Prime Money Market Fund</td>
<td>Invests in a combination of commercial paper, certificates of deposit, bankers' acceptances, and U.S. government securities. This fund typically offers the highest yield of our money market funds.</td>
<td>1.0% 2.7% 4.4%</td>
</tr>
<tr>
<td>Short-Term Corporate Bond Fund</td>
<td>Seeks current income by investing primarily in high-quality corporate bonds with an average maturity of 1 to 3 years. This fund's expense advantage allows it to pursue a higher level of income with less risk than comparable funds.</td>
<td>5.2% 6.6% 5.9%</td>
</tr>
<tr>
<td>Short-Term Tax-Exempt Bond Fund</td>
<td>Seeks current income exempt from federal tax by investing primarily in high-quality municipal securities with an average maturity of 1 to 2 years. This fund pursues a higher level of income than that provided by comparable funds.</td>
<td>2.3% 3.8% 3.8%</td>
</tr>
<tr>
<td>Short-Term Treasury Bond Fund</td>
<td>Seeks current income by investing primarily in direct government obligations, such as U.S. Treasury notes and other securities backed by the full faith and credit of the U.S. government, with an average maturity of 1 to 3 years. This fund pursues a higher level of income than that provided by comparable funds.</td>
<td>2.7% 7.1% 5.8%</td>
</tr>
<tr>
<td>Tax-Exempt Money Market Fund</td>
<td>Invests in high-quality municipal securities issued by state and local governments across the United States. This fund provides income that is exempt from federal tax.</td>
<td>1.0% 2.0% 2.9%</td>
</tr>
<tr>
<td>Treasury Money Market Fund</td>
<td>Invests solely in direct government obligations, such as U.S. Treasury bills and other short-term securities backed by the full faith and credit of the U.S. government. This</td>
<td>0.9% 2.6% 4.1%</td>
</tr>
</tbody>
</table>
fund offers the highest credit quality available.

<table>
<thead>
<tr>
<th>Fund</th>
<th>Description</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Index Stock Fund</td>
<td>The fund seeks to track the performance of a benchmark index that measures the investment return of large-capitalization value stocks.</td>
<td>23.8%</td>
<td>-6.3%</td>
<td>9.6%</td>
</tr>
<tr>
<td>Windsor Stock Fund</td>
<td>Seeks long-term capital growth and current income by investing primarily in the stocks of large and midsize companies believed by the advisers to have superior return potential not reflected in their current prices. This fund's advisers use both fundamental (company, industry, and economic research) and quantitative (computer modeling) analysis to identify those out-of-favor securities that will outperform the market over time.</td>
<td>30.7%</td>
<td>2.2%</td>
<td>10.6%</td>
</tr>
</tbody>
</table>
Target Retirement Option:

If you would like to participate in your employer’s 401k plan but you would rather not decide how to allocate your dollars among the various mutual funds offered for investment, you can choose to invest your money in what is known as a target retirement fund.

This fund starts with an appropriate mix of stocks and bonds based on the number of years until you retire. The asset mix then gradually and automatically becomes more conservative over time, as your retirement date nears.

<table>
<thead>
<tr>
<th>Years to Retirement</th>
<th>More than 30 years</th>
<th>21 to 30 years</th>
<th>11 to 20 years</th>
<th>5 to 10 years</th>
<th>Less than 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Initial Target Fund Asset Mix is:</td>
<td>80% stocks</td>
<td>70% stocks</td>
<td>60% stocks</td>
<td>50% stocks</td>
<td>40% stocks</td>
</tr>
<tr>
<td></td>
<td>15% bonds</td>
<td>25% bonds</td>
<td>35% bonds</td>
<td>40% bonds</td>
<td>45% bonds</td>
</tr>
<tr>
<td></td>
<td>5% money market</td>
<td>5% money market</td>
<td>5% money market</td>
<td>10% money market</td>
<td>15% money market</td>
</tr>
</tbody>
</table>

With the Target Retirement Fund, the portion of money invested in stocks is invested in 500 Index Stock Fund, the portion of money invested in bonds is invested in Long-Term Corporate Bond Fund, and the remainder is invested in the Federal Money Market Fund.
APPENDIX C

STUDY 2 FUND DESCRIPTIONS

Partitioned Fund Assortment (10 funds)\(^3\):

<table>
<thead>
<tr>
<th>Fund Name</th>
<th>Fund Objective</th>
<th>Average Annual Total Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 Year</td>
</tr>
<tr>
<td><strong>STOCK FUNDS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fidelity International Discovery</td>
<td>The fund seeks long-term growth of capital. Normally invests in foreign securities. It is typically diversified across several countries and regions. Management considers the size of the market in each country relative to the size of the international market as a whole when allocating assets. ● Expense ratio 1.01%. ● Sharpe ratio 2.38.</td>
<td>18.55%</td>
</tr>
<tr>
<td>Ivy Real Estate Securities (A)</td>
<td>The fund seeks total return through a combination of capital appreciation and current income. Normally invests at least 65% of assets in real estate and real estate-related securities. Most of the fund's real estate securities portfolio will consist of securities issued by Real Estate Investment Trusts (REITs) that are listed on a securities exchange or traded over-the-counter. In selecting securities, the fund's investment advisor considers such factors as an issuer's financial condition, financial performance, policies and strategies and competitive market condition. ● Expense ratio N/A. ● Sharpe ratio 1.91.</td>
<td>10.46%</td>
</tr>
<tr>
<td>Janus Contrarian</td>
<td>The fund seeks long-term growth of capital. Normally invests at least 80% of assets in securities with long-term growth potential. It may invest up to 20% of assets in high-yield bonds, up to 15% of assets in illiquid investments and without limit in foreign equity and debt securities. The fund is non-diversified. ● Expense ratio 0.93%. ● Sharpe ratio N/A.</td>
<td>16.02%</td>
</tr>
<tr>
<td>Merrill Lynch Small Cap</td>
<td>The fund seeks long-term capital appreciation. Normally invests at least 80%</td>
<td>13.25%</td>
</tr>
</tbody>
</table>

\(^3\) The unpartitioned condition listed all ten funds alphabetically, with no asset class headings.
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Expense Ratio</th>
<th>Sharpe Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Growth</strong></td>
<td>of assets in the equity securities of small companies in the United States. May also invest in non-U.S. issuers in the form of ADRs, EDRs, or GDRs. ADRs, EDRs, or GDRs. Expense ratio 1.25%. Sharpe ratio N/A.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Schwab S&amp;P 500 Index</strong></td>
<td>The fund seeks to track the total return performance of stocks that compose the S&amp;P 500 index. Normally invests at least 80% of assets in common stocks that compose the index. It buys and sells stocks primarily to match the index, to invest cash from share purchases, or to obtain cash for redemption of shares. Expense ratio 0.37%. Sharpe ratio 1.57.</td>
<td>4.66%</td>
<td>3.66%</td>
</tr>
<tr>
<td>Fund Name</td>
<td>Objective</td>
<td>Investment Strategy</td>
<td>Expense Ratio</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>Dreyfus Municipal Bond</strong></td>
<td>The fund seeks current income exempt from federal income tax, consistent with preservation of capital. Normally invests at least 75% of assets in municipal obligations. It invests at least 65% of assets in bonds and debentures, and at least 75% of assets in high-quality securities. However, the fund may invest in securities rated as low as D. It may also invest without limit in municipal securities subject to the Alternative Minimum Tax.</td>
<td>● Expense ratio 0.68%. ● Sharpe ratio 0.44.</td>
<td>3.92%</td>
</tr>
<tr>
<td><strong>Mass Mutual Short-Duration Bond (S)</strong></td>
<td>The fund seeks a high total return from current income while minimizing fluctuations in capital values. Normally invests at least 80% of assets in investment-grade fixed-income debt securities including U.S. dollar denominated obligations, securities issued or guaranteed by the U.S. government or its agencies, U.S. dollar-denominated bonds of foreign issuers, and mortgage-backed and other asset-backed securities. It may also invest up to 10% of assets in below investment grade debt securities. The duration of the fund's portfolio is three years or less.</td>
<td>● Expense ratio 0.54%. ● Sharpe ratio 0.12.</td>
<td>1.96%</td>
</tr>
<tr>
<td><strong>T. Rowe Price Inflation Protected Bond</strong></td>
<td>The fund seeks long-term capital appreciation. Normally invests at least 80% of assets in inflation-protected bonds. May invest up to 20% of assets in inflation-protected bonds issued by foreign governments or corporations linked to a non-U.S. inflation rate. May also invest up to 20% of assets in fixed income securities that are not indexed to inflation.</td>
<td>● Expense ratio 0.50%. ● Sharpe ratio 0.29.</td>
<td>2.32%</td>
</tr>
<tr>
<td><strong>Vanguard GNMA</strong></td>
<td>The fund seeks to provide a moderate level of current income. The fund normally invests at least 80% of assets in Government National Mortgage Association certificates. May invest the balance of assets in other U.S. government obligations, as well as in repurchase agreements secured by U.S. government securities. While the fund does not have specific maturity guidelines, it attempts to maintain an intermediate-term average weighted maturity.</td>
<td>● Expense ratio 0.20%. ● Sharpe ratio 0.23.</td>
<td>3.33%</td>
</tr>
<tr>
<td><strong>Vantagepoint Core</strong></td>
<td>The fund seeks current income and capital</td>
<td></td>
<td>2.08%</td>
</tr>
<tr>
<td>Bond Index I</td>
<td>growth. Primarily invests in U.S. government and corporate investment-grade obligations. It attempts to approximate the investment characteristics and performance of Lehman Brothers Aggregate Bond Index. ● Expense ratio 0.45%. ● Sharpe ratio 0.08.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX D

STUDY 3 FUND DESCRIPTIONS

Please indicate in the box next to each fund, what percent of your investment you would put in each fund (from 0 to 100 for each). Your percentages must add to 100.

DIVIDEND GROWTH FUND
Seeks to provide primarily an above-average level of current income and, secondarily, long-term capital appreciation and income. 12.9% 1-year return, 0.1% 5-year return, 6.4% 10-year return. Standard deviation = 6.61.

EMERGING MARKETS FUND
Seeks to track the performance of a benchmark index that measures the investment return of stocks issued by companies located in emerging market countries. 58.1% 1-year return, 22.7% 5-year return, 8.6% 10-year return. Standard deviation = 16.63.

EXPLORER FUND
Seeks to provide long-term capital appreciation by investing in a diversified group of small- and mid-capitalization stocks with prospects for above-average growth. 32.9% 1-year return, 8.9% 5-year return, 10.5% 10-year return. Standard deviation = 12.72.

EXTENDED MARKET FUND
Seeks to track the performance of a benchmark index that measures investment return of small- and mid-capitalization stocks. 30.2% 1-year return, 10.5% 5-year return, 9.5% 10-year return. Standard deviation = 11.13.

GLOBAL EQUITY FUND
Seeks to provide long-term capital appreciation. Invests primarily in U.S. and foreign stocks chosen mainly on the basis of bottom up stock analysis. Invests in both value and growth stocks as well as a mix of established and emerging stock markets. 30.2% 1-year return, 14.3% 5-year return, 11.9% 10-year return. Standard deviation = 9.42.

GNMA BOND FUND
Seeks current income by investing primarily in Government National Mortgage Association ("Ginnie Mae") securities, which are backed by the U.S. government to provide timely payment of principal and interest (yield and share price are not guaranteed). 3.3% 1-year return, 4.8% 5-year return, 6.2% 10-year return.
Standard deviation = 2.27.

GROWTH INDEX FUND
Seeks to track the performance of a benchmark index that measures the investment return of large-capitalization growth stocks.
15.3% 1-year return, 1.6% 5-year return, 8.2% 10-year return.
Standard deviation = 8.25.

HIGH-YIELD CORPORATE BOND FUND
Seeks to provide a high level of current income by investing in “junk bonds” which pay high interest rates because they are considered to carry a greater risk of default than bonds with higher credit ratings.
7.1% 1-year return, 6.0% 5-year return, 6.2% 10-year return.
Standard deviation = 4.16.

INTERMEDIATE-TERM BOND INDEX FUND
Seeks to track the performance of a market-weighted bond index with an intermediate-term dollar-weighted average value.
-0.5% 1-year return, 5.5% 5-year return, 6.5% 10-year return.
Standard deviation = 3.94.

LONG-TERM TAX-EXEMPT BOND FUND
Seeks current income exempt from federal tax by investing primarily in high-quality municipal securities with an average maturity of 12 to 25 years. This fund pursues a higher level of income than that provided by comparable funds.
3.1% 1-year return, 3.9% 5-year return, 5.1% 10-year return.

MID CAP STOCK INDEX FUND
Seeks to track the performance of a benchmark index that measures the investment return of mid-capitalization stocks. The fund employs a passive management approach designed to track the performance of the MSCI US Mid Cap 450 index, a broadly diversified index of the stocks of medium-size U.S. companies.
13.9% 1-year return, 11.4% 5-year return, N/A 10-year return.
Standard deviation = 10.43.

S&P 500 INDEX FUND
Seeks to track the performance of a benchmark index that measures the investment return of large-capitalization stocks.
15.3% 1-year return, 2.6% 5-year return, 8.9% 10-year return.
Standard deviation = 7.35.

SHORT-TERM TAX-EXEMPT BOND FUND
Seeks current income exempt from federal tax by investing primarily in high-quality municipal securities with an average maturity of 1 to 2 years. This fund
pursues a higher level of income than that provided by comparable funds. 2.2% 1-year return, 2.3% 5-year return, 3.2% 10-year return. Standard deviation = 0.51

SMALL CAP STOCK INDEX FUND
Seeks to track the performance of a benchmark index that measures the investment return of small-capitalization stocks. 31.3% 1-year return, 11.5% 5-year return, 10.3% 10-year return. Standard deviation = 12.21

SMALL CAP VALUE INDEX FUND
Seeks to track the performance of a benchmark index that measures the investment return of small-capitalization value stocks. 26.8% 1-year return, 13.1% 5-year return, N/A 10-year return. Standard deviation = 11.52

NONE OF THE ABOVE
If you would not invest in any of these funds, please put 100 in the box here. Otherwise leave this box blank.

Total