It's Not Only What You Know but also How Knowledgeable You Feel: Subjective Knowledge in Consumer Financial Decisions

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ABSTRACT

Recognizing that many consumers fail to make well informed financial decisions, governments, employers, and financial institutions have turned to various forms of financial education to help consumers choose more wisely. Unfortunately, the evidence as to the success of financial education in improving financial conduct is mixed. We propose that while financial education focuses on enhancing consumer actual knowledge, they fail to address consumers' feelings of relative ignorance. Consequently, they may paradoxically exacerbate this feeling and deter consumers from choosing more speculative or complicated options even when these options better suit consumer needs. In three studies, using different manipulations of subjective knowledge and various financial products, we show that increasing consumers' subjective knowledge about financial products influences, and may even improve, choice, independently of actual financial information available. We propose that methods that enhance subjective knowledge may be used to aid financial education programs in advancing wiser financial decisions.

Keywords: Consumer choice, financial decision making, metacognition, subjective knowledge, financial education

Among the most important decisions that consumers face are those that involve financial products—from the choice of investments in a retirement savings account to the terms of a mortgage to the lease parameters on a car. In recent years there has been an exponential proliferation of new and complex financial products that have come available to consumers. Unfortunately, a growing body of research suggests that many consumers lack the financial literacy to adequately evaluate and choose wisely among financial products (Benartzi and Thaler 2001; Benartzi et al. 2007; Choi, Laibson, and Madrian, 2005a, 2005b; Choi, Laibson, Madrian, and Metrick 2002; Lusardi 2008; Lusardi and Mitchell 2007). Recognizing that many consumers fail to make well-informed financial decisions, governments, employers, and financial institutions have turned to various forms of financial education to help consumers choose more wisely. However, evidence regarding the effectiveness of financial education in improving financial conduct is mixed (Choi et al. 2002).

We assert that the key to understanding why financial education programs often fail lies in understanding the subjective experience of financial decision makers. In particular, we explore the role of *subjective knowledge*, the subjective feeling of knowing, in financial decision making. We propose that holding actual knowledge or information about financial products constant, consumers feel more comfortable making investment decisions and more speculative choices as they feel more confident in their knowledge about relevant financial instruments. We provide empirical support for the impact of subjective knowledge on financial decisions in three studies than manipulate the extent to which one feels knowledgeable while holding relevant information constant. We suggest that when financial education programs focus on providing consumers with relevant product information, they fail to address consumers' feelings of relative ignorance, and may paradoxically exacerbate this feeling and deter consumers from choosing more speculative or complicated options even when they better suit the needs of the consumer.

We proceed as follows. First, we review the literatures on financial illiteracy and subjective knowledge. Next, we present the results of three experimental studies that illustrate the relationship between consumer subjective knowledge and financial decisions. We close with a discussion of implications of our results for financial literacy programs.

THEORETICAL BACKGROUND

Financial Well-Being and Financial Illiteracy

In the last decade, more and more employees have been shifted from Defined Benefit retirement saving plans, which guarantee a fixed payout at retirement depending on employee's salary and tenure in the plan, to Defined Contribution pensions, in which the payout depends on the amount of money contributed and the performance of the investments made (stocks, bonds, etc.). Consumers have therefore become increasingly responsible for their financial security at retirement. As a result, they now face a vast array of new financial decisions, such as how to invest in 401(k) retirement saving plans, whether to open a Roth or traditional Individual Retirement Account, whether to open a 529 college savings plan, how to decumulate savings at retirement, and many more (Lusardi and Mitchell 2007). Given the importance of such financial decisions to financial well-being, the proliferation of sophisticated financial products offered by different providers urgently requires that consumers be better educated about their options.

A growing body of research suggests that many consumers lack basic financial literacy necessary to evaluate financial choice options and choose wisely, even when full information is provided to them (Benartzi and Thaler 2001; Benartzi et al. 2007; Choi et al. 2005a, 2005b; Choi et al. 2002; Lusardi 2008; Lusardi and Mitchell 2007; Stango & Zinman, 2009a, 2009b). For example, Benartzi et al. (2007) reported that 20% of their survey respondents said they would rather have $1,000 of employer stock that they could not diversify until the age of 50 than $1,000 that they could invest without restrictions. Likewise, employees who attempt to diversify their investment portfolios do so in a naïve way that is not sensitive to the nature of the investments over which they are diversifying. Benartzi and Thaler (2001) find in experiments and archival data that consumers strongly tend toward spreading their money evenly among investments in their retirement savings plans. Langer and Fox (2010) show that this can lead to portfolio choices that systematically depend on whether investments happen to be grouped by vendor and whether consumers designate their investments in dollars or number of shares. They further find that this tendency is attenuated when consumers choose portfolios directly rather than allocate money among investments.

Not only do consumers have difficulty making wise decisions how to invest their retirement money; they also have difficulty making good decisions how much money to contribute. Choi et al. (2005b) examined seven companies that matched employee contributes their 401(k) retirement; that is, for every dollar employees contributed up to a certain threshold, their employer made an additional proportional matching contribution. Additionally, these plans allowed employees to make penalty-free withdrawals for any reason. Thus, for these employees, making the maximum matched contribution was the dominant option. Nevertheless, between 20% and 60% of these employees contributed less than the maximum amount, losing as much as 6% of their annual pay in matched contributions. Further investigation revealed that employees who failed to exploit the employer match were less financially literate than those at or above the match threshold.

In light of the importance of consumer financial deicsions and the recognition of such deficiencies in consumer financial decision making, governments, employers, and financial institutions have begun to engage in financial education through such means as paycheck stuffers, newsletters, summary plan descriptions, seminars, individual consultations with financial planners, and access to Internet based education and planning tools. Unfortunately, studies of such efforts have not found a consistently positive impact on consumer decisions. Although some papers have found a positive effect of financial education on financial decisions (Bayer, Bernheim, and Scholz 2008; Lusardi, 2008; Lusardi and Mitchell 2007), others have critiqued this work for methodological weaknesses such as the use of nonrepresentative samples, reliance on statements of intention rather than actual behavior, or confounds between a firm's provision of financial education and other factors that influence saving behavior such as the level and structure of compensation (Choi et al., 2002; Madrian and Shea 2001a).

In an attempt to overcome some of these issues, Madrian and Shea (2001b) examined the impact of financial education seminars on retirement saving behavior in 42 different locations of a particular company in which seminar attendance and actual saving behavior were tracked both before and after seminars. At the conclusion of the seminar, virtually all of the seminar attendees who were not already participating in a 401(k) plan said they planned to enroll. However, a scant 14% actually joined the plan following the seminar, compared to 7% of the employees who enrolled but had not attended a seminar. Apparently, educating employees about investment programs and options is not sufficient to induce high rates of enrollment.

Subjective Knowledge

The provision of financial education is based on the premise that consumers' tendency to choose wisely generally increases with their knowledge about options, a premise that has received ample empirical support in a variety of consumer choice contexts (see Alba and Hutchinson 1987 for an expensive review of research on consumer knowledge). For instance, researchers have found that when consumers are more knowledgeable about the product category they can better detect product-related information (Johnson and Russo 1984; Punj and Staelin 1983) and they require less attention to understand product-related information (Alba and Hutchinson 1987). Also, knowledgeable consumers rely more heavily on abstract product features than on "nonfunctional" attributes such as brand name or price (Park and Lessig 1981), and they tend to be more confident in their ability to make a good choice (Brucks 1985; Park and Lessig 1981; but see Carlson et al. 2009).

Consumer researchers frequently distinguish between objective knowledge, product-related information stored in memory such as relevant attributes or terminology, and subjective knowledge, the feeling of knowing (e.g., Brucks 1985; Carlson et al. 2009). The study of subjective *knowledge*, one's beliefs about one's own knowledge, and subjective *experiences*, the cognitive or affective experiences that accompany cognition (Flavell 1979), has consistently pointed to a dissociation between objective an subjective knowledge and experience across a wide range of research domains.

The importance of subjective *knowledge* is evident in a variety of phenomenon such as the tip-of-the-tongue effect, in which people fail to recall a word or a name but convinced that they know it (Brown and McNeill 1966), and in people's tendency to be overconfident in the accuracy of their likelihood judgments (Lichtenstein, Fischhoff, and Phillips 1982). Recent studies of decisions under uncertainty (e.g., Fox and Tversky, 1995; Fox and Weber, 2002), decisions in which the chances that different outcomes occur are not known in advance but need to be estimated by decision makers, have found that decision makers subjective level of knowledge can exert a strong impact on willingness to act, holding objective level of knowledge constant. For example, Fox and Weber (2002, Study 2A) asked American participants which of two candidates they thought would win the upcoming Russian election (a medium-knowledge item for most) and whether they would prefer receiving $50 for sure or $150 if they were correct. Half the participants received this item after being asked who they thought would win the upcoming American election (so the contrast with the American election made them feel less competent predicting the Russian election result) and half received this item after being asked who they thought would win the upcoming Dominican Republic election (so that the contrast with the Dominican Republic election they were made them feel more competent predicting the Russian election result). Although both groups presumably had the same objective level of knowledge concerning the Russian election (on average), the group that felt less knowledgeable was much less likely to bet on their forecast.

In addition, people often rely on subjective *experiences* such as processing fluency in forming judgments and decisions (Alter and Oppenheimer 2009; Koriat 2007; Schwartz 2004). For instance, Novemsky et al. (2007) reported that the experience of difficulty in retrieving product-relevant information from memory and the difficulty in processing new product information enhance choice deferral and choice of a compromise option, regardless of the content of the information retrieved.

We assert that most consumer financial education programs are designed mainly to enhance consumers' objective level of financial knowledge and generally do not give as much priority to enhancing consumers' subjective level of knowledge. Interestingly, studies of decision making cited above suggest that subjective knowledge can have a profound impact on consumers' willingness to invest, even if a potential investment is more speculative or less familiar. We propose that interventions designed to promote a subjective feeling of financial competence can affect financial decision making. Furthermore, when the less familiar and more speculative options are more suitable for consumers – these interventions may improve choice.

The three studies that follow test the hypotheses that

H1: Subjective knowledge about financial products influences financial choice independently of one's level of objective knowledge about the available choice options.

H2: Holding objective knowledge constant, promoting consumers' subjective knowledge about financial products advances preference for more speculative or less familiar choice options.

H3: The provision of advanced financial information deters consumers from acting through its negative impact on subjective knowledge.

We continue by describing three studies designed to test these hypotheses. In Study 1 we hold information constant concerning two possible investments, and manipulate subjective knowledge by contrasting the level of information provided with another set of possible investments. Study 2 explores the impact of subjective knowledge on willingness to enroll in 401(k) retirement saving plans. Together, Study 1&2 provide evidence supporting hypothesis H1 and H2. Finally, in Study 3 we directly examine H3 and show that, by providing consumers with more elaborate financial information, financial education programs deter consumers from choosing those options because the more elaborate information is more difficult to understand and thus undermines consumers' feeling of knowledge.

Study 1: Subjective Knowledge is Relative

When offered to choose between various investments, consumers are often provided with information on past returns of the available options. However, the scope of the information may vary from one investment option to another for various reasons, such as the length of time a fund has been in existence or the availability of public information about the company whose stock one may wish to invest in. The first study examined the impact of subjective knowledge (SK) on preference for safe investment option offering a constant rate of return versus risky investment option offering a variable return. Subjective knowledge was manipulated by contrasting the level of information provided on the relevant investment options with another set of possible investments.

We presented participants with information about past performance of two *target* investments (a safe and a risky investment), over a fixed set of periods, and then asked them to choose between these investments. We manipulated SK through the relative amount of information we previously provided participants concerning a *reference* set of investments. Participants in the low-SK condition received *more* information about the returns of the investment options of the *reference* set of investments, thereby leading to the perception that they were relatively poorly-informed about the returns of the target investments; participants in the high-SK condition received *less* information about the returns of the *reference* set of investments, thereby leading to the perception that they were relatively well-informed about the returns of the target investments. Based on previous research showing that SK is positively associated with willingness to act (Fox and Tversky 1995; Fox and Weber 2002), we hypothesized that high-SK participants would be more likely than low-SK participants to choose the risky investment option over the safe option in the target choice task.

Method. Twenty-four undergraduate students participated in the study for payment. The study included two choice tasks, each asking the participants to imagine wanting to invest money for a period of one month and to choose among two investment options: one that had consistently yielded positive returns (the “safe” fund) and another that had yielded varying positive returns (the “risky” fund). In the first (reference) choice task the safe fund consistently yielded a 5% monthly return and the risky fund yielded a 10% monthly return or no return with equal probability. In the second (target) task, the safe fund consistently yielded a 3% monthly return and the risky fund yielded a 4% monthly with probability .8 and a 0% return otherwise. Participants were not provided summary information about each fund’s past returns. Instead, they were presented with the monthly return of each fund, one at a time, in a random order. Participants viewed information for one fund followed by the other and then indicated which investment they would choose for a one-month investment.

Participants in the high-SK condition viewed the returns of each fund for past 10 months in the reference task and 20 months in the target task. Participants in the low-SK condition viewed the returns of each fund for past 40 months in the reference task and 20 months in target task. Note that all participants received the same level information about past returns of each fund of the target task (20 months) and thus had the same level of objective knowledge. Therefore, any differences between conditions can only be attributed to varying levels of SK resulting from the contrast between the amount of information provided in the reference and target tasks. We hypothesized that participants would be more likely to choose the more speculative risky investment in the high-SK knowledge condition. Table 1 summarizes the return distribution and the amount of information provided about each fund in the reference and target choice tasks, per condition.

Insert Table 1 about here

Results and Discussion. Results conformed to our prediction. In support of our hypothesis, 62% of the participants in the high-SK condition, but none of the participants in the low-SK condition chose to invest in the risky fund in the target task ($p < .002$ by Fisher's exact test). Since all participants received the same information about the choice alternatives of the target choice task, the difference in preference between the high- and low-SK conditions cannot be attributed to objective information, but to SK only.

In sum, Study 1 demonstrates that holding objective knowledge constant, the *relative* amount of information can influence willingness to make an investment. We surmise that this is due to stronger feelings of knowledge, although we did not measure subjective knowledge directly. In Study 2 we examine the impact of subjective knowledge on willingness to join 401(k) retirement saving plans, holding information about 401(k) plans constant. We manipulate subjective knowledge by asking participants an easy or difficult to answer question in finance before asking them to rate their willingness to join 401(k) plans. We further ask participants to rate their level of knowledge of 401(k) plans and examine whether these subjective ratings mediate willingness to join these plans.

Study 2: When Intimidating Questions Undermine Subjective Knowledge

Americans are not adequately financially prepared for retirement. About a quarter of American employees eligible to participate in 401(k) retirement saving plans fail to do so, even when offered valuable employer matching contributions and tax advantages for contributing (www.retirementsecurityproject.org). Policy makers are thus striving to find ways to encourage employees to join retirement saving plans. This study examined whether enhancing employees' subjective knwoledge about 401(k) retirement saving plans increases the likelihood that they join these plans.

Participants in the low-SK condition were asked a difficult-to-answer question about finances whereas participants in the high-SK condition were asked an easy-to-answer question about finances. We predicted that the difficulty to answer the question in the low-SK condition would emphasize participants' ignorance and would therefore diminish SK; in contrast, the ease of answering the question in the high-SK condition would emphasize participants' knowledge and would therefore enhance SK. We further expected that the higher participants' SK, the more willing they would be to join 401(k) plans.

Method. Two hundred undergraduate students at a major West Coast university answered a brief survey as part of a larger packet of unrelated items in exchange for $20. We provided participants with the following brief information on 401(k) retirement plans:

> *A 401(k) plan is a type of employer-sponsored retirement plan under section 401(k) of the Internal Revenue. The plan allows a worker to save for retirement while deferring income taxes on the saved money and earnings until withdrawal. The employee elects to have a portion of his or her wage paid directly, or "deferred", into his or her 401(k) account. In most cases, the employee can select from a number of investment options that emphasize stocks, bonds, money market investments, or some mix of the above. The employee can generally re-allocate money among these investment choices at any time.*

We next asked participants a question allegedly designed to evaluate their general financial knowledge. Half the participants (high-SK condition) were asked an easy-to-answer question ("*Which is expected to yield a higher return over a period of 10 years, a saving account or a stocks investment?*") and the other half of participants (low-SK condition) were asked a difficult question ("*What was the annual change in value of the NASDAQ 100 index in 2008? ____%").* Finally, we asked participants to rate their knowledge of 401(k) retirement plans and the likelihood they would join a 401(k) plan once they were eligible to do so on a 7-point scale (1 = Very low, 7 = Very high).

Note that the objective information provided on 401(k) plans was identical in the two SK conditions. Moreover, since participants were randomly assigned to the high- and low-SK conditions, we can safely assume that, on average, participants in the high-SK condition had the same level of objective knowledge about 401(k) plans as participants in the low-SK condition. Therefore, any differences in willingness to join 401(k) plans may only be attributed to differences in SK.

Results and Discussion. A manipulation check confirmed that a much higher proportion of participants correctly answered the easy question (62%) than the difficult question (2%) ($p < .001$ by Fisher's exact test).

An examination of the impact of the SK manipulation confirmed that participants who were asked an easy question rated their knowledge of 401(k) pension plans higher than participants who were asked a difficult question ($M_{Easy} = 2.85$, $M_{Difficult} = 2.00$, $t(173) = 3.96$; $p < .0002$) and indicated that they were more likely to join 401(k) plans ($M_{Easy} = 5.5$, $M_{Difficult} = 5.04$, $t(173) = 2.06$; $p < .05$).

We conducted a meditation analysis to test the hypothesis that the difficulty to answer the financial question influences willingness to join 401(k) plans through its impact on SK (Barron and Kenny 1986). In the first regression SK ratings were found to be significantly predicted by difficulty to answer the financial question (SK-condition) ($\beta = .29$, $t = 3.96$, $p < .001$). Next, Willingness to join 401(k) plan was found to be significantly predicted by the difficulty to answer the financial question ($\beta = .15$, $t = 2.06$, $p < .05$). Finally, when willingness to join 401(k) plan was regressed on difficulty to answer the financial question as well as on SK ratings, the effect of difficulty to answer the financial question was no longer significant ($\beta = .02$, $t = 0.32$, *NS*), while the effect of SK ratings remained significant ($\beta = .46$, $t = 6.51$, $p < .0001$; Sobel $z = 3.39$, $p < .001$). This suggests that the effect of the difficulty to answer the financial question on willingness to join 401(k) plan was fully mediated by SK. In other words, participants who easily answered the financial question believed they knew more about 401(k) plans and were thus more willing to join them.

Studies 1 & 2 provided empirical support for hypotheses H1 and H2, showing that subjective knowledge about financial products influences financial choice independently of objective knowledge about the choice options, and that, holding objective knowledge constant, promoting consumers' subjective knowledge about financial products increases preference for more speculative or less familiar choice options. Study 3 examines H3 and tests the implications for financial education more directly. We contrast two financial choice options – one that is described in basic terms, which most participants are expected to understand, and one which is described more advanced and technical terms which are more difficult to understand and thus expected to diminish SK.

Study 3: Why Financial Education Doesn't Work? Providing More Information Can Diminish Subjective Knowledge

Attempting to promote financial literacy, the primary focus of consumer financial education programs has been increasing objective financial knowledge. Through various means such as paycheck stuffers, newsletters, summary plan descriptions, seminars, individual consultations with financial planners, or access to Internet based education and planning tools, financial education provides consumers with more financial information (Bayer, Bernheim, and Scholz 2008; Lusardi, 2008; Lusardi and Mitchell 2007).

While subjective knowledge generally increases with the actual amount of information provided, this is not always the case (see Carlson et al., 2009 for a meta-analysis). Imagine having to decide between two investment options. The information concerning investment A is easily understood by most people; the information concerning investment B is similar to the information concerning investment A, only it includes additional advanced and more technical information that might aid someone with advanced financial knowledge in assessing the attractiveness of the investment, but not without difficulty. From a normative standpoint, holding all other aspects constant, consumers should be more inclined to choose investment B over A because having more diagnostic information can only improve their choice. However, we propose that receiving advanced information in a more technical form diminished consumers' subjective feeling of knowledge and renders the investment less attractive. We suggest that consumer education fail for this exact reason – providing consumers more information about financial choice options diminishes their subjective knowledge, and therefore deters them from action.

Preliminary support for this assertion comes from a study by Fox and Weber (2002, Study 4a) in which Stanford undergraduates were first asked whether they thought inflation rate in Holland over the previous year was greater than or less than 3.0%, then asked to choose between (a) $50 for sure or (b) $150 if they were correct about the inflation rate. Half the participants were provided additional macroeconomic data that could have been useful to someone with extensive training in economics, but presumably was not useful to undergraduates (indeed, it did not significantly change their assessment of inflation). Nevertheless, participants provided with the additional information were much less likely to bet on their assessment of inflation.

Study 3 examined these hypotheses by asking participants to choose between two mutual funds about which summary fund descriptions were provided, a prevalent financial education method (Bayer, Bernheim, and Scholz 2008; Lusardi, 2008; Lusardi and Mitchell 2007). Specifically, student participants were asked to choose between two "lifestyle" mutual funds that gradually shift from a stock-heavy portfolio to a bond-heavy portfolio over the course of one's working life. For each participant one fund was described in basic terms that include its most important elements; the other fund was described in a more advanced and a more technical and jargon-laden manner. We hypothesized that providing advanced and more technical information concerning an option would diminish consumers' subjective knowledge and only deter them from choosing it.

Method. We recruited 143 senior management undergraduate students at an Israeli college to participate in a brief survey for course credit. Participants were asked to imagine that they wanted to start saving for retirement at the age of 30 until they are 70, and that they have been offered two mutual funds especially designed for retirement saving. They were presented with brief descriptions of the funds and were asked to indicate which fund they would prefer saving in, and to rate their knowledge about each fund, the extent to which they understood the saving mechanism of each fund, and how comfortable they would be investing in each fund, on a 7-point scale (1 = Not at all, 7 = Very much).

The funds participants were asked to choose from differed in risk level (low, high) and in the description provided (basic, advanced). The proportion of assets invested in stocks (and otherwise in bonds) in the high-risk fund began at 80% and gradually decreased to 30%, whereas the proportion of assets invested in stocks in the low-risk fund began at 50% and decreased to 10%. The *basic* fund description explained the parameters in relatively simple terms. For example, the basic description of the low risk fund was as follows:

> *The fund consists of two elements: (1) a diversified stock Index fund, designed to mirror the composition of the S&P 500 index, a risky but a more profitable long-term investment option, and (2) bonds in the form of 30-year U.S. Treasury Bills, a conservative saving option yielding lower long-term return. In the beginning of the saving period 50% of your savings will be invested in stocks (and 50% will be invested in bonds). This mix will gradually shift, at a fixed rate once a year, from stocks to bonds until you retire, at which point 10% will be invested in stocks (and 90% in bonds).*

The *advanced* information explained the same parameters in more technical terms as well as additional information on the investment's Standard Deviation and Beta, two commonly used parameters of investment risk. For example, the advanced description of the low risk fund was as follows:

> *The fund consists of two elements: (1) a diversified stock Index fund, designed to mirror the composition of the S&P 500 index, a risky but a more profitable long-term*

investment option, and (2) bonds in the form of 30-year U.S. Treasury Bills, a conservative saving option yielding lower long-term return. The rate of exposure to equity at any given time will not exceed 80-A where A = the insured's age (in years). The risk level of the investment equals a standard deviation of 20% in the beginning of the saving period and will gradually diminish, at a fixed rate once a year, to a standard deviation of 12% at retirement. The fund's Beta will be 0.6 at the beginning of the saving period and will gradually diminish, at a fixed rate once a year, to 0.1 upon retirement.

Note that the participants, who have completed several courses in economics and finance, were familiar with the concepts and measures presented in the basic as well as the advanced descriptions. Despite the variations in content, the basic and advanced information were equal in length when translated into Hebrew (about5 lines).

The study entailed a 2×2 design in which we varied, between-subjects, whether the high-risk and the low-risk fund were described in basic or advanced terms. Participants were randomly assigned to one of four conditions: (1) both funds were described in basic terms; (2) both funds were described in advanced terms; (3) the high-risk fund was described in basic terms and the low-risk fund was described in advanced terms; (4) the high-risk fund was described in advanced terms and the low-risk fund was described in basic terms. The order of presentation of the funds was counterbalanced.

Results and Discussion. An examination of the choice data reveals that the choice of the high- versus the low-risk fund depended on the funds' descriptions ($\chi^2_{(3)} = 11.76; p < .01$): when both funds were described in basic or in advanced terms (conditions 1 & 2) the majority of participants preferred to invest in the low-risk fund (61% and 58%, respectively). When the high-risk fund was described in advanced terms and the low-risk fund was described in basic terms (condition 4), the tendency to choose the low-risk fund is increased (84%). However, when the high-risk fund was described in basic terms and the low-risk fund was described in advanced terms (condition 3), the tendency to choose the low-risk fund attenuated (46%). The proportion of participants choosing the low-risk fund in each of the four experimental conditions is presented in figure 1.

Insert figure 1 about here

To further examine the impact of fund description on choice we ran a Logistic Regression where choice (of the low-risk fund) was regressed on two dummy variables – the description of the low-risk fund and the description of the high-risk fund. The results indicated that the likelihood of choosing the low-risk fund was higher with basic description of the low risk fund ($\beta = -0.91$, $\chi^2_{(1)} = 6.3$; $p < .02$) and with the advanced description of the high risk fund ($\beta = 0.80$, $\chi^2_{(1)} = 4.9$; $p < .03$).

Participants' ratings of their knowledge about each fund, the extent to which they understood the saving mechanism of each fund, and how comfortable they would be investing in each fund were highly correlated and were therefore averaged to form two composite SK measures - for the low- and high-risk funds (Cronbach's $\alpha = .86$ and $\alpha = .83$, respectively).

We conducted a mediation analysis to directly examine our hypothesis that fund descriptions affect choice because through their influence on SK. The above ogistic regression indicated that low- and high-risk fund descriptions affect choice. In order to establish that SK mediates the relationship between fund description and choice we conducted additional analyses (Barron and Kenny 1986). First, two Simple Regression analyses regressed SK on fund descriptions: the first analysis found that SK of the low-risk fund was higher with basic than with advanced fund description ($\beta = -0.56$, $t(140) = -8.0$; $p < .0001$); the second analysis revealed the same pattern for the high-risk fund ($\beta = -0.40$, $t(140) = -5.2$; $p < .0001$). The results of these two simple regression analyses show that fund description influenced SK in the hypothesized direction. Finally, we conducted another Logistic Regression where choice (of the low-risk fund) was regressed on the low-risk fund description, the high-risk fund description (the independent variables), SK of the low-risk fund, and SK of the high-risk fund (the mediators). The results revealed that when all four variables were entered into the regression analysis, the low-risk fund description ($\beta = -0.03$, $\chi^2_{(1)} = 0.003$; *NS*) and the high-risk fund description ($\beta = -0.03$, $\chi^2_{(1)} = 0.007$; *NS*) no longer predicted choice. However, SK of the low-risk fund ($\beta = 0.58$, $\chi^2_{(1)} = 7.6$; $p < .01$) and SK of the high-risk fund ($\beta = -0.72$, $\chi^2_{(1)} = 11.5$; $p < .001$) still significantly predicted choice. These results support the hypothesis that SK fully mediates the relationship between fund description and choice.

In sum, the results support our hypothesis, indicating that advanced information of an investment option deter consumers from choosing it. Moreover, we find that this effect is mediated by consumers' perceptions of their subjective knowledge concerning the two funds.

SUMMARY AND GENERAL DISCUSSION

Taken together, the present studies demonstrated that subjective knowledge can have a substantial impact on consumer financial decisions, holding objective knowledge constant. In particular, consumers who believe they are more knowledgeable about financial products are more likely to invest in riskier options with higher expected long-term returns, more likely to enroll in a 401(k) retirement saving plan, and more likely to invest in a mutual fund that varies in its composition over time.

While past research has acknowledged the unique impact of subjective knowledge on judgment and behavior, its impact on financial consumer choice has not yet been examined. In an attempt to help consumers choose financial products more wisely, governments, employers, and financial institutions have tried to promote objective consumer financial knowledge through various forms of financial education. Unfortunately, they have not been able to drive a significant change in financial decisions. The current findings suggest one possible reason for this curious finding: financial education programs, in their attempts to enhance the objective knowledge of consumers, can actually undermine their subjective knowledge, leading consumers to prefer safe investment options, which often yield lower returns, and deter them from acting on new financial possibilities.

It is important to note that we do not propose that financial education, in the current forms, will be discarded. Instead, the present findings offer a boundary condition to the situations where providing consumers with information is beneficial in improving financial choice. Out findings suggest that it is better to provide more basic information, which does not threaten consumers' subjective knowledge, than advanced information that may be more diagnostic but could hamper it. When the financial information cannot be simplified enough, subjective knowledge may be enhanced by emphasizing consumers' existing experience and knowledge, for instance, by asking consumers about their experience with less familiar financial products or a relevant question that consumers are expected to be able to know.

One question that remains open is whether enhancing subjective knowledge may at a certain point have deleterious effects on consumers. Consumers who believe they are especially knowledgeable may, for example, make reckless investments or refuse information about financial products that could otherwise help them make better decisions. Indeed, previous research on consumer goods indicates that highly knowledgeable consumers or consumers who report themselves to be highly knowledgeable search less for product information and thus learn less about products than moderately knowledgeable consumers (Bettman & Park, 1980; Johnson & Russo, 1984). Future research should examine the impact of varying degrees of metacognitive knowledge on the quality of financial choice.

REFERENCES

Alba, Joseph W. and Wesley J. Hutchinson (1987), "Dimensions of Consumer Expertise," *Journal of Consumer Research*, 13, 411-454.

Alter, Adam L. and Daniel M. Oppenheimer (2009), "Uniting the Tribes of Fluency to Form a Metacognitive Nation," *Personality and Social Psychology Review*, 13(August), 219-235.

Bayer, Patrick J., B. Douglas Bernheim, and John K. Scholz (2008), "*The Effects of Financial Education in the Workplace: Evidence from a Survey of Employers*," Working paper, NBER.

Benartzi, Shlomo and Richard H. Thaler (2001), "Naive Diversification Strategies in Defined Contribution Savings Plans," *American Economic Review*, 91(l), 79-98.

Benartzi, Shlomi, Richard, H. Thaler, Stephen P. Utkus, and Cass R. Sunstein (2007), "The Law and Economics of Company Stock in 401(k) Plans," *The Journal of Law and Economics,* 50(May), 45 - 79.

Bettman, James,R. and C. Whan Park (1980), "Effects of Prior Knowledge and Experience and Phase of the Choice Process on Consumer Decision Processes: A protocol Analysis," *Journal of Consumer Research*, 7(December), 234-248.

Brown, Roger and David McNeill (1966), "The "Tip of the Tongue" Phenomenon," *Journal of Verbal Learning and Verbal behavior*, 5, 325-337.

Brucks, Merrie (1985), "The Effects of Product Class Knowledge on Information Search Behavior," *Journal of Consumer Research*, 12(June), 1-16.

Carlson, Jay P., Leslie H. Vincent, David M.. Hardesty, and William O. Bearden (2009), "Objective and Subjective Knowledge Relationships: A Quantitative Analysis of Consumer Research Findings," *Journal of Consumer Research*, 35(February), 864-876.

Choi, James J., David Laibson, and Brigitte C. Madrian (2005a), "Are Empowerment and Education Enough? Underdiversification in 401(k) Plans", *Brookings Papers on Economic Activity*, 2, 151-198.

Choi, James J., David Laibson, and Brigitte C. Madrian (2005b*) "$100 Bills on the Sidewalk: Suboptimal Investment in 401(K) Plans,"* Working Paper 11554, NBER Working Paper Series.

Choi, James J., David Laibson, Brigitte C. Madrian, & Metrick, A. (2002), "Defined Contribution Pensions: Plan Rules, Participant Choices, and the Path of Least Resistance," *Tax Policy and the Economy*, 16, 67-113.

Flavell, John H. (1979), "Metacognition and Cognitive Monitoring: A New Area of Cognitive-Developmental inquiry," *American Psychologist*, 34(October), 906-911.

Fox, Craig R. and Amos Tversky (1995), "Ambiguity Aversion and Comparative Ignorance," *Quarterly Journal of Economics,* 110, 585-603.

Fox, Craig R. and Martin Weber (2002), "Ambiguity Aversion, Comparative Ignorance, and Decision Context," *Organizational Behavior and Human Decision Processes*, 88, 476-498.

Koriat, Asher (2007), "Metacognition and Consciousness," in *Cambridge Handbook of Consciousness,* Philip D. Zelazoa, Morris Moscovitch, and Evan Thompson, eds. New York, USA: Cambridge University Press, 289-326.

Langer, Thomas, and Craig R. Fox (2010), "Partition-dependence, unit-dependent, and procedure dependence in consumer financial decisions," Unpublished paper, University of Muenster.

Lichtenstein, Sarah, Fischhoff, Baruch, and Lawrence D. Phillips (1982), "Calibration of probabilities: The state of the art to 1980," in *Judgment under uncertainty: Heuristics and* *biases*, Daniel Kahneman, Paul Slovic, and Amos Tversky, eds. New York: Cambridge University Press, 306-334.

Lusardi, Annamaria and Olivia S. Mitchell (2007), "Financial Literacy and Retirement Preparedness: Evidence and Implications for Financial Education", *Business Economics*, January, 35-44.

Lusardi, Annamaria (2008), "*Household Saving Behavior: The Role of Financial Literacy, Information, and Financial Education Programs,"* Working Paper 13824, NBER Working Paper Series.

Madrian, Brigitte C. and Dennis F. Shea (2001a), "The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior," *Quarterly Journal of Economics*, 116(November), 1149-1187.

Madrian, Brigitte C. and Dennis F. Shea (2001b), "*Preaching to the Converted and Converting Those Taught: Financial Education in the Workplace,"* Working Paper, University of Chicago.

Novemsky, Nathan, Ravi Dhar, Norbert Schwartz, and Itamar Simonson (2007), "Preference Fluency in Choice," *Journal of Marketing Research*, XLIV(August), 347-356.

Park, C. Whan and V. Parker Lessig (1981), "Familiarity and Its Impact on Consumer Decision Biases and Heuristics," *Journal of Consumer Research*, 8(September), 223-231.

Schwartz, Norbert (2004), "Meta-Cognitive Experiences in Consumer Judgment and Decision Making," *Journal of Consumer Psychology*, 14, 332-348.

Stango, Victor, and Jonathan Zinman (2009a), "Exponential Growth Bias and Household Finance," *Journal of Finance,* 64, 2807-2849.

Stango, Victor, and Jonathan Zinman (2009b), "Fuzzy Math, Disclosure Regulation and Credit Market Outcomes: Evidence from Truth in Lending Reform," Unpublished paper, UC Davis Graduate School of Management.

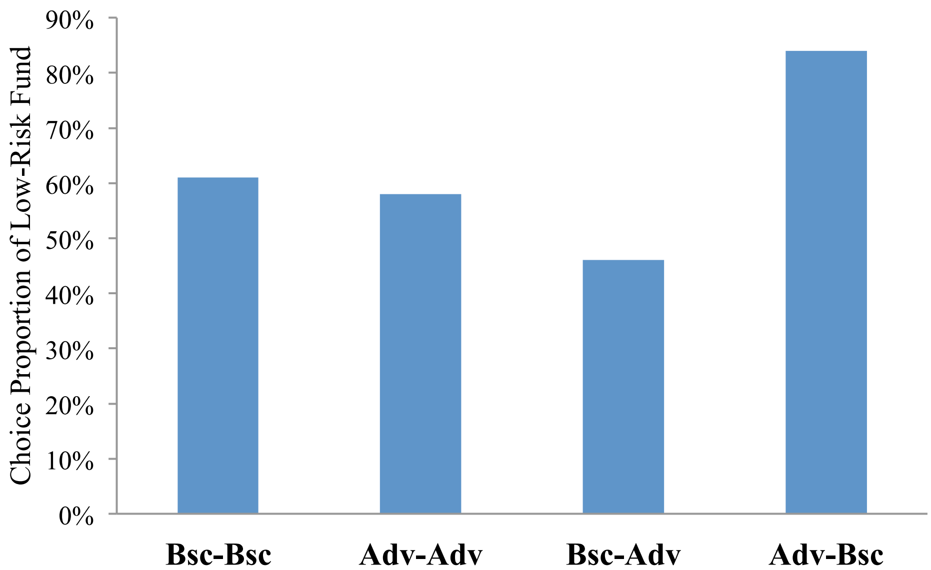

Figure 1. Choice proportion of the low-risk fund in the four conditions. *Bsc* stands for a basic description; *Adv* stands for an advanced description. The left fund description refers to the high-risk fund and the right fund description refers to the low-risk fund. For example, *Adv-Bsc* refers to condition 4, in which the high risk fund was described in advanced terms and the low-risk fund as described in basic terms.

TABLE 1: RETURN DISTRIBUTIONS AND AMOUNT OF INFORMATION PROVIDED FOR EACH FUND IN THE REFERENCE AND TARGET CHOICE TASKS.

Choice task	Amount of information about each fund	Low-SK Condition		Amount of information about each fund	High-SK Condition	
		Safe fund	Risky fund		Safe fund	Risky fund
Reference	40 months	5% return (1)	10% return (0.5); 0% returns, (0.5)	10 months	5% return (1)	10% return (0.5); 0% returns (0.5)
Target	20 months	3% return (1)	4% return, (0.8); 0% returns, (0.2)	20 months	3% return (1)	4% return, (0.8); 0% returns, (0.2)

In the reference task, the safe fund consistently yielded a 5% monthly return and the risky fund yielded a 10% monthly return or no return with equal probability. In the target task, the safe fund consistently yielded a 3% monthly return and the risky fund yielded a 4% monthly with probability 0.8 and a 0% return otherwise. The rate of return of each fund is presented and the probability of receiving each return appears in parentheses. Participants in the low-SK condition received *more* information about the returns of the *reference* funds (40) compared to the *target* funds (20), leading to the perception that they were relatively poorly-informed about the target funds; participants in the high-SK condition received *less* information about the returns of the *reference* funds (10) compared to the *target* funds (20), leading to the perception that they were relatively well-informed about the target funds. Note that the return distribution and the amount of information about the target funds were similar across SK conditions, indicating that objective knowledge was held constant.