

# Describing investor profiles: A test of the associations among financial knowledge, confidence, and help and information sources

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## Abstract

Faced with multiple asset choices for use when developing a household portfolio, investors often turn to various sources of help and information for help before making an investment decision. This study used a large, nationally drawn dataset of individuals who own financial assets to explore the relationships between and among types of investments owned, knowledge characteristics, investor confidence, and help and information sources. General profiles of investors emerged from the analyses that can be used by financial planners to better understand the unique profiles of those who own certain types of investments. Investors who exhibited over-confidence in their financial knowledge were more likely to hold annuities, cash value life insurance, and commodities. It was also determined that financial planners play an important role in promoting diversification and mitigating portfolio risk.

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## 1. Introduction

Investors have access to various asset alternatives that can be used when developing a portfolio at the household level. Obvious investment choices include stocks (equities), bonds

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(fixed-income securities), mutual funds, and exchange traded funds (ETFs). Other asset alternatives include annuities, cash value life insurance, commodities, and real estate. The financial planning literature offers robust normative and descriptive explanations of the household characteristics associated with the ownership of certain investments. For example, those who own stocks tend to be wealthier, better educated, more risk tolerant, and more knowledgeable about the financial markets (Kuzniak, Rabbani, Heo, Ruiz-Menjivar, and Grable, 2015; Wang and Hanna, 2007). The characteristics of those who prefer bonds include general financial risk aversion, being older/retired, and having a fixed or limited time horizon (Gibson, 2000). The literature indicates that there is considerable heterogeneity in investor profiles, yet the underlying sources of these differences are not well understood. There are a number of possible explanations for heterogeneity in investor profiles, such as variability in risk tolerance (see Barsky, Juster, Kimball, and Shapiro, 1997; Kimball, Sahm, & Shapiro, 2008), barriers to entry that vary across households (Vissing-Jorgensen, 2002), and differences in the riskiness or magnitude of a household's non-financial wealth, for example, human capital (Guiso, Jappelli, and Terlizzese, 1996; Heaton and Lucas, 2000; Vissing-Jorgensen, 2002). Although, previous empirical research has found some evidence for each of these explanations, much of the observed variation in household characteristics is still unexplained.

In addition, it is less well known, or described in the literature, if household characteristics are shared across investment types. One might imagine that the profile of a stock investor differs significantly from that of an annuity investor, or that those who own bonds are more likely to also own cash value life insurance. Determining whether such assumptions are true and what may be the underlying explanation for differences (or similarities) is important in the context of financial planning. Specifically, financial planners need insights into the profile of investors who are more or less likely to hold specific types of investment products. Understanding how an investor's profile relates to her or his investment preferences and choices is one way to more precisely match portfolio development needs to a client's unique situation.

Over the past 20 years, two distinct lines of research have taken place to better understand the general profile and specific characteristics of investors. These studies have practical significance to the providers of financial services. One line of inquiry has revolved around understanding how preferences, attitudes, and behavioral and cognitive biases influence investment choices. Much of this research has centered on the concept of investor confidence. Consider the work of Barber and Odean (2001). They found that over-confident investors (typically men) trade excessively, usually to the detriment of portfolio diversification and performance. The notion of confidence encompasses a variety of variables, including knowledge, expectations, and preferences. As such, being able to identify states of under- or over-confidence has emerged as a powerful financial planning tool to describe investor profiles.

The hypothesis underlying the over-confidence model is that investors often over-estimate the value of private financial knowledge. This insight has led to the second line of inquiry into investor profiles: the role of information search and help-seeking behavior. Existing help-seeking research has resulted in the development of several frameworks used to describe the profile of those who are more likely to use the services of a professional financial

advisor compared with other sources of help, including family, friends, colleagues, and the media. The outgrowth of this type of research has resulted in documentation that financial professionals add value by helping clients better implement recommendations that reduce tax liabilities (i.e., gamma) (Blanchett and Kaplan, 2013) and decrease wealth volatility (i.e., zeta) (Grable and Chatterjee, 2014). The source of help may partially explain the types of assets owned by investors. Financial planners, as well as other financial advisors, have a vested interest in understanding how the source of financial help an investor uses to guide financial decision making can influence the preference for and use of specific investment products. It is reasonable to expect that the help-seeking behavior of investors moderates the effect of confidence on the preference for specific investment assets.

Curiously, very little work has been conducted to determine the synergistic roles of confidence and help and information sources as factors associated with an investor's profile. The purpose of this study was to add to the existing literature in three ways: first, to develop profiles of investors across several asset classes; second, to estimate the association between over- and under-confidence and asset ownership, and third, to describe the association between help seeking characteristics and ownership of specific investment assets. It was hypothesized that source of help might moderate the effect of being over- or under-confident in relation to owning certain types of investments. The results from this study provide insights into understanding the heterogeneity among investors who hold various investments in their portfolios. This information can be used to more effectively anticipate the type of approach a financial planner ought to take when working with clients in relation to investment strategies and recommendations.

## 2. Review of literature

Expected utility theory of choice under uncertainty assumes that investors are (1) rational, (2) able to deal with complex choices, (3) risk-averse, and (4) wealth-maximizing. Utility theory predicts that a rational investor will select a portfolio that maximizes expected returns while minimizing risk. That is, at a given expected return, a rational investor will prefer a low-risk asset over a high-risk asset. However, this prediction does not discriminate between investors based on exhibited confidence. Odean (1998) found that over-confident investors hold riskier portfolios than other investors with the same degree of risk aversion. Standard economic theory also assumes that investors have complete information about the market. However, Verrecchia (1982) showed that investors who face a higher cost of acquiring information, and those who are risk averse, acquire less information, often because these investors intend to invest less in stocks. This means that more informed investors are likely to invest in riskier assets, whereas less informed investors are likely to invest in less risky assets. The existing evidence suggests that over-confidence and excessive information search lead to suboptimal asset allocation choices.

The following discussion provides an overview of investor confidence and help and information sources in the context of investment choices and outcomes. Research on investor financial attitudes, demographics, and socioeconomic factors is also reviewed.

### *2.1. Over-confidence*

Nearly all models of over-confidence are based on the premise that some investors exhibit a degree of over-confidence when making investment decisions. Over-confident investors tend to trade more and take more risk than other investors, including those who exhibit under-confidence. Odean (1998) showed that over-confident investors are more likely to obtain lower overall utility, often over reacting to new information. Unlike other investors, over-confident investors overestimate the precision of their knowledge (Odean, 1998). When viewed holistically, over-confident investors often to exhibit behaviors that negatively impact investment performance (Barber and Odean, 2001; Bruine de Bruin, Parker, and Fischhoff, 2007; Statman, Thorley, and Vorkink, 2006). In addition to the observation that over-confidence leads to substandard portfolio performance, it is also known that over-confidence is associated with less diversification and higher portfolio turnover. Gervais and Odean (2001) found that over-confident traders trade too aggressively, which is often accompanied by increasing trading volume. Moreover, over-confident traders behave sub-optimally, eventually lowering their expected profits. Additionally, higher trading volumes, at both the individual and market level, have been linked with over-confidence.

Bruine de Bruin et al. (2007, 2012) found a relationship between better decision-making skills and fewer negative outcomes. A key variable in their study was confidence. Bruine de Bruin et al. (2007, 2012) reported a significant correlation between maximizing decision processes, partly by reducing over-confidence, and obtaining better investment outcomes.

Over-confidence has been shown to be associated with the gender of an investor. Barber and Odean (2001) reported that men trade more often and, therefore, perform less well than women. Biais, Hilton, Mazurier, and Pouget (2005) reached similar conclusions in an experimental setting where they found that problematic trading performance was related to over-confidence.

Over-confidence is known to be associated with other types of financial behavior as well. Consumers who display over-confidence with regard to financial knowledge are more likely to engage in problematic credit behaviors (Allgood and Walstad, 2013; Robb, Babiarz, Woodyard, and Seay, 2015; Woodyard, Robb, Babiarz, and Jung, 2017), although exceptions have been noted in the literature. For example, investors with more confidence in their financial ability than actual knowledge may be more prone to pay off credit cards, which is a desirable outcome, but this tendency diminishes with age (Allgood and Walstad, 2013). Robb and his associates (Robb et al., 2015) noted that alternative financial services, such as payday loans, title loans, and rent-to-own arrangements, were more likely to be used by those (1) exhibiting an over-confidence condition, (2) having below median levels of objective financial knowledge, and (3) holding higher levels of subjective financial knowledge or confidence.

Over-confidence can be viewed as a “false-positive” condition in the context of financial decision making. Woodyard et al. (2017) found that over-confident decision makers are less likely to engage in positive financial behaviors, such as having an emergency savings plan and always paying off a credit card in full at the end of the month. Woodyard et al.’s work reinforced earlier findings from the literature on the connection between financial knowledge and positive financial behaviors (e.g., Robb and Woodyard, 2011).

In summary, the current literature shows that over-confidence often leads to substandard portfolio performance, less diversification, and higher portfolio turnover. Moreover, over-confident investors trade more and take more risk. However, little is known about the association between dimensions of confidence and investment asset holdings. Based on the review of literature, it is reasonable to hypothesize that over-confident investors are likely to hold more risky assets. The current study evaluates this possibility by testing the following hypothesis:

H<sub>1</sub>: There is a direct relationship between confidence level and investment asset holdings.

## 2.2. *Help and information search behavior*

Investors are generally counseled to search for additional information when doing so will increase expected utility (Grossman and Stiglitz, 1980). Over-confident investors take such advice to extremes. They tend to hold unrealistic beliefs about their knowledge and expend too many resources (e.g., time and money) on investment information (Odean, 1998), typically as a means to confirm previously established opinions. Barber and Odean (2001) found support for the prediction that investors who possess too much information may often trade speculatively.

The concept of household level help and information seeking has been extensively examined in the financial planning literature over the past two decades. Grable and Joo (1999) were among the first to propose a framework of help-seeking behavior in personal financial planning. The Grable and Joo framework was based on a help-seeking for health care model originally described by Suchman (1966). The Grable and Joo framework described six-stages of help seeking based on the hypothesis that consumers conduct internal cost/benefit analyses when deciding to seek help and where to seek help. Grable and Joo originally focused on a simple decision to either seek help or not to seek help. Later, Grable and Joo (2001) expanded the model to examine the choice of seeking help from a financial professional or a non-professional. Those who indicated the use of financial planners, financial counselors, insurance agents, or stockbrokers as their primary help provider were classified as seekers of professional help, while those who indicated the use of friends, family, or work colleagues as their primary help provider were classified as seekers of non-professional help.

Kwon (2004) identified four types of help and information sources based on whether the source is personal or impersonal, and whether the source is marketer-controlled, such as a salesperson with potential personal gains to be made from a transaction or non-personal, such as family, friends, and other neutral sources (e.g., news media). Kwon noted that friends and family were the most frequently used source of help and information, which matched what Grable and Joo (2001) reported. Chang (2005) found that income was a major determinant of financial help seeking, in that higher-income households were more likely to seek professional advice while lower-income households relied upon social networks, such as family or co-workers.

Closely related to the concept of help seeking is the concept of information search. Information search tends to be broader than help seeking. Whereas models of help seeking

are typically designed to provide insights into the mechanisms associated with the choice and use of help providers, information search behavior includes elements related to activities designed to improve knowledge. The term “information intermediary” can refer to the media, to advertising, to a search engine, or any other non-human source of information that is not originally produced by the provider (Rose, 1999). The use of information intermediaries helps consumers save time when making decisions or when acquiring new/additional information.

It is not necessary for an information intermediary to provide direct help. Lee and Cho (2005) evaluated the use of information intermediaries based on value perceptions. They concluded that value can be attached to differing characteristics. The model developed by Lee and Cho did not account for the actual cost of intermediary services (e.g., using an internet search vs. consulting a financial advisor), but the model did help Lee and Cho conclude that a large portion of the public indicate an unwillingness to pay for financial advice. In their model, younger consumers reported a higher value for intermediary sources, perhaps reflecting a lack of confidence or knowledge among younger consumers. Lee and Cho also found higher levels of education were associated with enhanced perceptions of value from information intermediaries. Lee and Cho reported that perceived expertise was negatively associated with perceived value, implying that consumer information search activities may be indicative of a defensive posture related to confidence in the financial markets.

The literature provides some evidence that there may be parallels in the search for health information with that of financial information search behavior (Grable and Joo, 1999; Woodyard and Grable, 2014). Chen and Feeley (2014) found that the relationship between numeracy and self-efficacy in health behavior was mediated by information seeking behavior through multiple channels, including mass media, professional providers, friends, and family members. Numeracy, which is often considered a component of financial knowledge (Robb and Woodyard, 2011), has also been found to be related to risk tolerance (Sages and Grable, 2010) and other factors that are known to be related to financial literacy (Lusardi, 2012) and help seeking. In this regard, Hung and Yoong (2010) found that solicited, or sought, advice was more effective in changing consumers’ retirement plan behaviors than unsolicited advice.

In summary, the existing literature shows that some investors, particularly those who exhibit over-confidence, often make aggressive investment decisions and trade speculatively. However, little is known about the way in which help and information sources relate to investment choices. Investment holdings likely vary based on the type of help and information source used by an investor. The current study evaluates this possibility by testing the following hypothesis:

H<sub>2</sub>: There is a direct relationship between help and information source and investment asset holdings.

### *2.3. Other factors associated with investment asset holdings*

Based on the literature, some demographic factors are known to be associated with asset allocation choices. Stock holdings are generally thought to proportionally increase with age (Ameriks and Zeldes, 2004). Additionally, the likelihood of under-diversification is greater among younger, less-educated, and low-income investors (Goetzmann and Kumar, 2008),

whereas higher income tends to be associated with holding more diversified portfolios (Anderson, 2013; Calvet, Campbell, and Sodini, 2007; Roche, Tompaidis, and Yang, 2013). It is worth noting that some research shows that housing crowds out stockholding (Cocco, 2005; Hu, 2005). Additionally, business owners often exhibit risky asset ownership tendencies (Faig and Shum, 2002; Xiao, 1996).

Gender differences in financial knowledge, satisfaction, and asset choices have been well documented in the literature. Woodyard and Robb (2012), for example, found a consistent gender gap across most age groups with regards to objective financial knowledge, although less so for subjective knowledge, financial satisfaction, and participation in actual financial behavior. Studies of college students (e.g., Chen and Volpe, 2002) and older Americans (e.g., Lusardi and Mitchell, 2007) have also indicated a disparity in financial literacy by gender. Household specialization has been offered as an explanation for these differences (Fonseca, Mullen, Zamarro, and Zissimopoulos, 2012).

Demographic and socioeconomic characteristics are also thought to be associated with a wide range of decision making outcomes. For example, age (younger), gender (male), education (more), and wealth (more) are known to be associated with financial risk tolerance generally and investment decision making specifically (Barber and Odean, 2001; Duasa and Yusof, 2013). Those with a higher risk tolerance have been shown to be more likely to seek professional financial help (Joo and Grable, 2001). Hanna (2011) reinforced this finding by noting that those who are financially less tolerant of risk are less likely to seek financial advice from professionals.

As highlighted in this review, the identification of household characteristics associated with investor confidence, help seeking, and ownership of investments is robust, with each topic area having a well-defined understanding of important factors. However, a gap exists in the literature. Specifically, little is known about the profile of investors across asset categories or whether characteristics such as confidence, help seeking preferences, and attitudes are the same or different among those who hold various investment assets. What is known is that older investors tend to hold more fixed-income assets compared with others, and that, overall, risk averse investors also hold less risky assets. While these types of descriptions are quite useful, they lack the depth to be able to identify nuances between and among investors. More specifically, the literature is relatively silent when it comes to describing how investor confidence and the use of sources of help jointly describe patterns of asset ownership.

While it is generally acknowledged that an investor's confidence level, source of decision making help, and risk tolerance are associated with behavioral outcomes, few studies have tested the moderating effects of these constructs. The literature suggests that those who exhibit over-confidence may seek more and varied information, which can then result in different investment asset ownership decisions. Models of over-confidence and help-seeking emphasize that help-seeking behavior can have a moderating role on the relationship between confidence level and investment asset holdings, whereas the risk tolerance literature provides a basis for suggesting that an investor's willingness to take financial risk may also play a moderating role.<sup>1</sup> If the type of help and information source moderates the relationship between confidence level and investment asset holdings, then the strength of the relationship between confidence and investment asset holding should differ based on the type of help and

information source. For example, the relation between confidence and investment asset holdings might be stronger for investors who receive help and information from a professional financial advisor and less strong or non-existent for investors who receive help and information from television. The current study evaluates this possibility by testing the following hypotheses:

- H<sub>3</sub>: The relationship between confidence level and investment asset holdings is moderated by help and information source.
- H<sub>4</sub>: The relationship between confidence level and investment asset holdings is moderated by risk tolerance.

### 3. Methodology

Data for this study were obtained from the 2015 National Financial Capability Study (NFCS), which was funded by the FINRA Investor Education Foundation. The sample was comprised of adults over the age of 18 who also completed the 2015 State-by-State NFCS Survey and indicated that they had investments outside of retirement accounts. This delimitation decision was made because investing outside of a retirement account (e.g., taxable brokerage account) involves a different set of decisions on the part of the investor. For example, investors in non-retirement accounts generally must choose between and among asset choices, whereas retirement plan choices are usually predetermined by a plan administrator (and often limited to mutual fund investments). For the purposes of this study, the sample was also delimited to those who were the primary or shared decision-maker regarding investments for the household. The sample for the survey was a subset of the larger State-by-State survey and selected at random from three online panels. These panels were designed to validate the inclusion of respondents based on current demographic characteristics. The survey was self-administered using a website link in July 2015. Respondents were not told that the Investor Survey and the State-by-State Survey were related. Findings from the survey were weighted to approximate the investor population in terms of age and education, based on the 2015 NFCS State-by-State Survey. No additional weighting was used to account for non-response bias. Given missing data, the final sample size used in the study included 1,987 individuals.

#### 3.1. *Dependent variables*

The dependent measure was a binary variable that indicated whether investors currently owned any of the following investments in non-retirement accounts: (1) individual stocks; (2) individual bonds; (3) mutual funds; (4) exchange traded funds; (5) fixed, indexed, or variable annuities; (6) whole life insurance or similar investment products; (7) commodities or futures; and (8) other investments such as REITs, options, private placements, or structured notes. Answers were coded 1 = yes, 0 = no for each investment holding. It was possible for a respondent to indicate owning more than one type of asset; however, everyone in the sample owned at least one of the eight investment types.



### 3.2. Independent variables

The independent variables included confidence level, financial risk tolerance, demographic characteristics, financial education, student loans, financial stress, and financial self-efficacy. The following discussion describes each independent variable in greater detail.

#### 3.2.1. Confidence level

A multiple step process was used to calculate a respondent's level of financial confidence. First, each respondent's objective investment knowledge was estimated using 10 questions (see Appendix) developed by the FINRA Investor Education Foundation. The sum of correct answers to these questions served as an indicator of respondents' objective financial knowledge. The mean objective financial knowledge score was 4.66 (SD = 2.23).

Next, a measure of each respondent's subjective evaluation of her or his financial knowledge was evaluated with the following question: "On a scale of 1 to 7, where 1 means very low and 7 means very high, how would you assess your overall knowledge about investing?" The mean score was 4.86 (SD = 1.39). Objective financial knowledge scores were then used to predict subjective knowledge scores in an Ordinary Least Square (OLS) regression as follows:

$$\text{Subjective Knowledge Score} = b_0 + b_1 \text{Objective Knowledge Score}$$

The regression model was statistically significant ( $F(1, 1986) = 125.22, p < 0.001$ ). The predicted unstandardized value (i.e., predicted knowledge score) was saved for each respondent. The predicted mean score, across the sample, was 4.85 (SD = 0.34).

Next, the confidence level of each respondent was estimated by subtracting the predicted subjective financial knowledge score from his or her self-reported subjective financial knowledge score. In this study, positive scores indicated knowledge over-confidence, with negative scores suggesting knowledge under-confidence. As expected, the mean confidence score was 0.00 (termed congruent in this study), with a standard deviation of 1.35. The minimum score was -4.21, while the maximum score was 2.86, indicating a general level of under-confidence among respondents.

Confidence level scores were then recoded dichotomously by classifying anyone whose knowledge confidence score was one standard deviation or higher above the mean as being over-confident (coded 1, otherwise 0). Those whose score was one standard deviation or lower below the mean were categorized as under-confident (coded 1, otherwise 0). Approximately 68% of respondents were classified as being congruent in their knowledge assessment, with 16% classified as over-confident and 16% categorized as under-confident.

#### 3.2.2. Help and information sources

Four help and information source categories were created. The categories were based on responses to the following question: "Which of the following information sources do you use when making an investment decision?" Nine possible answers were provided: (1) stockbro-

kers; (2) financial advisors; (3) information from the company the respondent was investing in (e.g., annual reports, company websites); (4) information from brokerage firms, mutual fund companies, or other financial services companies (e.g., analyst reports, brochures, newsletters, seminars, and websites); (5) industry regulators (e.g., FINRA, SEC, and state securities regulators); (6) “media,” which included television, radio, newspapers, magazines, online news sources, and financial information websites; (7) investment clubs or investor membership organizations; (8) employers; and (9) friends, colleagues, or family members. It was possible for a respondent to indicate the use of more than one help provider. These sources of help and information were re-categorized. The first help-seeking category was called “actively sought help at a cost.” This included the use of (1) stockbrokers and (2) financial advisors. The second help-seeking category was termed “actively sought help for free.” This category included (1) information from the company the respondent was investing in (e.g., annual reports, company websites); (2) information from brokerage firms, mutual fund companies, or other financial services companies (e.g., analyst reports, brochures, newsletters, seminars, and websites); and (3) industry regulators (e.g., FINRA, SEC, and state securities regulators). The third category was called the media, which included television, radio, newspapers, magazines, online news sources, and financial information websites. The fourth help-seeking category was called “networks.” This category included (1) investment clubs or investor membership organizations; (2) employers; and (3) friends, colleagues, or family members.

### 3.2.3. *Financial risk tolerance*

Financial risk tolerance was measured with one item that was adapted from the Survey of Consumer Finances: “Which of the following statements comes closest to describing the amount of financial risk that you are willing to take when you save or make investments?” Four options were provided: 1 = take substantial financial risks expecting to earn substantial returns; 2 = Take above average financial risks expecting to earn above average returns; 3 = Take average financial risks expecting to earn average returns; and 4 = not willing to take any financial risks. Given the coding of responses, a dichotomous variable was created with 1 = willing to take some risk (i.e., answers 1, 2, and 3 combined), otherwise 0.

### 3.2.4. *Confidence in the security markets*

Two confidence items regarding the security markets were included in the analysis. The first asked, “How confident are you that U.S. financial markets offer good long-term opportunities for investors?” The second asked, “How confident are you that U.S. financial markets are fair to all investors?” A 10-point scale was used to record answers to both items, with 1 = not at all confident and 10 = extremely confident. The mean and standard deviation score for each item was 7.05 (SD = 2.03) and 5.81 (SD = 2.47), respectively.

### 3.2.5. *Control variables*

Based on the review of literature, several additional control variables were used in the analysis, including gender, age, ethnicity, education, income level, and value of investments. A summary of the descriptive statistics for the independent variables is shown in Table 1.

Table 1 Descriptive statistics for the independent variables

Variables	Distribution	Mean (SD)
Gender		
Male	55.1%	
Female	45.0%	
Age		
18 to 34 years	16.2%	
35 to 54 years	31.6%	
55+ years	52.3%	
Ethnicity		
White	80.3%	
Non-White	19.7%	
Education		
Some college or less	39.0%	
College (Bachelor's) or more	61.0%	
Income		
< \$50,000	21.0%	
\$50,000 to \$100,000	44.7%	
\$100,000+	34.4%	
Value of Investments		
Less than \$2,000	5.1%	
\$2,000 to less than \$5,000	4.3%	
\$5,000 to less than \$10,000	5.8%	
\$10,000 to less than \$25,000	7.3%	
\$25,000 to less than \$50,000	8.1%	
\$50,000 to less than \$100,000	15.0%	
\$100,000 to less than \$250,000	19.9%	
\$250,000 to less than \$500,000	15.9%	
\$500,000 to less than \$1,000,000	10.5%	
\$1,000,000 or more	8.0%	
Risk tolerance		
Some risk	90.5%	
No risk	9.5%	
Long-term market confidence		$M = 7.05$ (SD = 2.03)
Confidence in fairness of markets		$M = 5.81$ (SD = 2.47)
Over-confident		
Yes	16.0%	
No	84.0%	
Under-confident		
Yes	15.6%	
No	84.4%	
Active fee help (AC)		
Yes	67.9%	
No	32.2%	
Active free help (AF)		
Yes	85.1%	
No	14.9%	
Media help		
Yes	47.8%	
No	52.2%	
Network help		
Yes	57.4%	
No	42.6%	

### 3.2.6. Interaction terms

Finally, interaction terms were created to account for possible moderation effects between over- and under-confidence and financial risk tolerance and help and information sources. Each variable was centered before creating interaction terms.

### 3.3. Data analysis method

Eight logistic regression models were estimated. The outcome variable in each model was whether a respondent owned an investment asset (i.e., individual stocks, individual bonds, mutual funds, ETFs, annuities, cash value life insurance, commodities, or other investment assets). The operationalized models were estimated using the following formula:

$$p = \frac{(e^{a+b_d d^x + b_v v^x + b_r r^x + b_c c^x + b_o o^x + b_u u^x + b_h h^x + b_i i^x})}{(1 + e^{a+b_d d^x + b_v v^x + b_r r^x + b_c c^x + b_o o^x + b_u u^x + b_h h^x + b_i i^x})} \quad (1)$$

where:

$p$  = the probability of asset ownership,

$e$  = the base of natural logarithms,

$a$  = the equation constant,

$b_s$  = beta coefficients

$x_s$  = set of independent variables ( $d$  = demographic variables,  $v$  = value of investments,

$r$  = risk tolerance,  $c$  = market confidence,  $o$  = over-confidence,  $u$  = under-confidence,

$h$  = help-seeking sources,  $i$  = interactions)

## 4. Results

Table 2 provides a summary of results from the eight logistic regression analyses. Each of the models was statistically significant, with the amount of explained variation in the outcome variables ranging from approximately 11% to 23%. The one consistent factor associated with investment asset ownership across the models was the value of a respondent's investments. In each case, the relationship was positive. This result was not surprising given who was in the sample; namely, individuals who indicated some level of asset ownership. A weak endogeneity issue may have been present within the sample. To be included in the study, individuals already exhibited asset ownership tendencies. It is reasonable to assume, based on the results from Table 2, that there was a direct association between owning investment assets and holding more wealth in such assets. Given the purposes of this study, the directional causality issue was not deemed to be a significant problem. The endogeneity issue indicates what is already known: a key element associated with the profile of those who own specific types of investment assets is a greater likelihood of holding more wealth in investments. Instead, this study provides more nuanced indicators of investment asset ownership. Results from each regression are discussed below.

Table 2 Logistic regression analyses showing patterns of investment asset ownership

Variables	Stocks		Bonds		Funds		ETFs		Annuities		CV life		Commodities		Other	
	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)
Gender (1 = M, 2 = F)	-.01	.99	.34**	1.41	.03	1.03	-.05	.95	-.01	.99	-.15	.86	-.20	.82	-.19	.83
Age	-.04	.96	-.37**	.69	-.22*	.80	-.41**	.66	.02	1.02	-.03	.97	-.60**	.55	-.06	.94
Ethnicity (1 = W, 2 = NW)	.06	1.06	.11	1.12	-.19	.83	.19	1.21	.18	1.20	.19	1.21	.27	1.31	.27	1.31
Education (1 = some college or less, 2 = college or more)	.00	1.00	-.17	.85	.19	1.21	.19	1.21	-.26*	.77	-.28*	.76	.09	1.10	-.03	.97
Income	.14**	1.15	-.05	.96	-.05	.95	-.02	.98	-.20*	.82	.15*	1.16	-.12	.89	-.15	.86
Value of investments	.08**	1.09	.26**	1.30	.32**	1.38	.19**	1.21	.27**	1.31	.10**	1.10	.18**	1.19	.23**	1.26
Risk tolerance (1 = some risk, 0 = no risk)	.75**	2.11	-.08	.92	.59**	1.81	4.36	77.92	-.21	.81	-.20	.82	.22	1.25	.29	1.33
Long-term market confidence	.22	1.24	.04	1.04	-.10*	.91	.00	1.00	.06	1.06	.10*	1.11	.05	1.05	-.10	.91
Confidence in fairness of markets	.04	1.04	.13	1.14	.18	1.19	.32**	1.37	-.21*	.82	-.17*	.84	.22	1.25	.43**	1.54
Over-confident	-.19	.83	.25	1.29	-.48*	.62	.01	1.01	.64**	1.89	.54**	1.71	.59*	1.80	-.10	.90
Under-confident	.64	1.89	.75	2.11	-.10	.90	-.17.20	.00	-.28	.76	-.39	.68	-.78	.46	.15	1.16
Active fee help	-.07	.93	.66**	1.94	.63**	1.87	.31*	1.37	.99	2.70	.54**	1.71	.50*	1.66	.05	1.06
Active free help	.23	1.26	.44*	1.56	.24	1.27	-.14	.87	-.18	.84	.34	1.41	-.12	.89	-.12	.89
Media help	.32*	1.38	.23*	1.26	-.10	.91	.32*	1.38	-.03	.97	.04	1.04	.26	1.29	.34*	1.40
Network help	.08	1.08	.19	1.21	-.09	.91	-.16	.85	.39**	1.48	.44	1.56	.45*	1.57	.01	1.01
RisksxOverConf	.69	1.98	-.16	.85	-.06	.94	.47	1.60	.20	1.22	-.36	.70	.45	1.57	.04	1.04
RisksxUnderConf	.05	1.05	-.10	.91	.20	1.22	17.21	2.16	-.25	.78	.00	1.00	.78	2.17	-.25	.78
AFeeOverConf	1.17**	3.23	.15	1.16	.24	1.27	-.11	.89	-.45	.64	.12	1.12	.27	1.31	.18	1.19
AFreeOverConf	.44	1.55	.32	1.37	-.06	.94	-.31	.74	1.09*	2.97	.34	1.41	-.09	.92	.52	1.69
MediaOverConf	.21	1.24	.22	1.25	.35	1.41	.36	1.44	.25	1.28	.84**	2.32	.40	1.50	1.20**	3.31
NetworksxOverConf	-.88*	.42	.83*	2.30	.06	1.06	1.02**	2.76	.50	1.65	.78*	2.19	.19	1.21	-.29	.75
AFeeUnderConf	-.63	.53	-.22	.80	-.34	.71	-.57	.57	.06	1.06	-.53	.59	-.236**	.09	.25	1.28
AFreeUnderConf	.66	1.93	.24	1.27	-.36	.70	.15	1.16	.38	1.47	-.87*	.42	.81	2.26	-.14	.87
MediaUnderConf	-.04	.96	.11	1.11	-.47	.63	-.08	.92	-.09	.91	.47	1.59	-.30	.74	.25	1.28
NetworksxUnderConf	-.97*	.38	-.17	.85	.41	1.51	-.76	.47	-.16	.85	.10	1.11	1.20	3.32	.21	1.24
Constant	-2.34**	.10	-3.73**	.02	-1.84**	.16	-5.37**	.01	-1.94**	.14	-1.47**	.23	-4.35**	.01	-4.70**	.01

ETFs = exchange traded funds; Exp = experiment. Model statistics—Stocks:  $\chi^2 = 144.28, p < .001$ ; Nagelkerke  $R^2 = 0.11$ ; Bonds:  $\chi^2 = 270.30, p < .001$ ; Nagelkerke  $R^2 = .19$ ; Funds:  $\chi^2 = 288.81, p < .001$ ; Nagelkerke  $R^2 = .21$ ; ETFs:  $\chi^2 = 263.42, p < .001$ ; Nagelkerke  $R^2 = 0.21$ ; Annuities:  $\chi^2 = 253.34, p < .001$ ; Nagelkerke  $R^2 = .18$ ; Cash Value Life Insurance:  $\chi^2 = 170.90, p < .001$ ; Nagelkerke  $R^2 = .14$ . Commodities:  $\chi^2 = 228.96, p < .001$ ; Nagelkerke  $R^2 = .23$ ; Other:  $\chi^2 = 145.93, p < .001$ ; Nagelkerke  $R^2 = .14$ . \* $p < .05$ , \*\* $p < .01$ .

#### 4.1. *Individual stocks*

Three confidence interactions were noted. Those who were over-confident and sought help from a stockbroker or financial advisor were more likely to report owning stocks. On the other hand, over-confident respondents who sought help from networks were less likely to own stocks. Confidence in one's own financial knowledge was not directly associated with individual stock ownership. Instead, confidence moderated by a help provider was related to holding stock. Income, the value of investments, risk tolerance, and seeking help from the media were found to be positively associated with individual stock ownership.

#### 4.2. *Individual bonds*

One interaction was noted. Over-confident respondents who obtained help and information from networks were more likely to report owning individual bonds. The results indicate that sources of help are significant factors associated with bond ownership. The value of investments, seeking help from a stockbroker or financial advisor, seeking active free help, and obtaining information from the media were found to increase the likelihood of owning individual bonds. Age was negatively related to the likelihood of owning bonds.

#### 4.3. *Mutual funds*

No interactions were noted. The findings suggest that mutual fund ownership offers less appeal to investors who are over-confident in their own knowledge and confident in the future of the investment markets. The value of investments, risk tolerance, and working with a stockbroker or financial advisor were found to increase the likelihood of owning mutual funds. Age, having greater confidence in the markets, and being over-confident were associated with a decreased likelihood of owning mutual funds. It may be that mutual fund investors select other investment assets unless otherwise counseled by a stockbroker or financial advisor.

#### 4.4. *Exchange traded funds*

A positive interaction was noted between being over-confident and seeking help from a network. Those fitting this profile were 2.76 times more likely to report owning ETFs. Similar to individual stock ownership, the profile of ETF investors included younger confident investors. Sources of help also increased the likelihood of owning ETFs. The value of investments, greater confidence in the fairness of the markets, and seeking help from a stockbroker or financial advisor were found to be related to an increased likelihood of owning ETFs. The relationship was negative for age.

#### 4.5. *Annuities*

A positive interaction between being over-confident and seeking help from free sources was found to be associated with an increased likelihood of annuity ownership. Results indicate that the profile of annuity investors is nuanced, with higher income and better

educated investors shying away from annuities, and over-confident investors purchasing annuities. The value of investments, being over-confident, and seeking help from networks was found to be associated with an increased likelihood of owning annuities. Having at least a college level of education, more income, and greater confidence in the markets was negatively related to annuity ownership.

#### *4.6. Cash value life insurance*

Three interactions were noted. Being over-confident and seeking help from the media and networks were related to an increased likelihood of insurance ownership, whereas being under-confident and seeking help from free sources was negatively associated with insurance holdings. These findings indicate that confidence and sources of help can be used to describe the profile of life insurance investors. As a sold product, it was not surprising that working with a financial professional was positively associated with annuity ownership. Income, the value of investments, long-term market confidence, being over-confident, and seeking help from stockbrokers and financial advisors were positively associated with the likelihood of owning cash value life insurance. A negative association was noted between education and confidence in the fairness of the markets and cash value life insurance holdings.

#### *4.7. Commodities and futures*

A negative interaction between being under-confident and seeking help from a stockbroker or financial advisor was noted. Findings suggest that those who invest in commodities and futures tend to be younger over-confident individuals who work with paid financial help providers. The value of investments, being over-confident, seeking help from stockbrokers and financial advisors, and seeking help from networks were found to be positively associated with an increased likelihood of commodity and futures holdings. The relationship between age and owning commodities and futures was negative.

#### *4.8. Other investments*

A positive interaction between being over-confident and seeking help from the media was noted. Those fitting this profile were 3.31 times more likely to report holding other investment assets. These findings indicate that measures of confidence and sources of help describe, in part, the profile of investors in other assets. The value of investments, being confident in the fairness of the markets, and seeking help from the media were also associated with an increased likelihood of holding other assets, including REITs.

## **5. Discussion**

Table 3 summarizes the findings from the eight models. Partial support was found for the first hypothesis that stated there is a direct relationship between confidence level and investment asset holdings. Those who were over-confident held more annuities, cash value

Table 3 Variables associated with the likelihood of owning different investment assets

	Stocks	Bonds	Funds	ETFs	Annuities	CV life	Commodities	Other
Age		-	-	-			-	
Education					-	-		
Income	+				-	+		
Value of investments	+	+	+	+	+	+	+	+
Risk tolerance	+		+					
Long-term market confidence			-			+		
Confidence in fairness of markets				+	-	-		+
Over-confidence (knowledge)			-		+	+	+	
Active fee help		+	+	+		+	+	
Active free help		+						
Media help	+	+						+
Network help					+		+	
AFeexOverConf	+							
AFreexOverConf					+			
MediaxOverConf						+		+
NetworksxOverConf	-	+		+		+		
AFeexUnderConf							-	
AFreexUnderConf						-		
NetworksxUnderConf	-							

life insurance, and commodities. However, over-confident investors held fewer mutual fund assets. In general, support was found for the second hypothesis that stated there is a direct relationship between help and information source and investment asset holdings. Investors who used active fee help were more likely to own bonds, mutual funds, ETFs, life insurance, and commodities. Bond ownership was associated with the use of free help sources. Those who relied on the media held more stocks, bonds, and commodities, whereas those who used networks owned more annuities and commodities. Some support was also found for the hypothesis that posited a moderation effect between confidence level and help and information source, with those who (1) used network information sources and (2) exhibited over-confidence owning more bonds, ETFs, and cash value life insurance but few stocks. Among other associations, over-confident investors who used active fee help providers owned more stock. No support was found for the hypothesis that stated the relationship between confidence level and investment asset holdings is moderated by risk tolerance.

As noted above, it was not surprising that the value of investments exhibited a strong positive association with investment asset ownership. This relationship can be viewed in a number of ways. For example, it takes financial resources to purchase investments outside a retirement plan. As such, it makes sense that those with more investment assets would hold a wider variety of investments. Also, this finding highlights the relationship between holding wealth in investments and diversification. Those with more wealth, either out of prudence or through serendipity, tend to be better diversified than those with fewer investable resources.

Demographic factors were less consistent in describing the profile of investors. Age was negatively associated with securities ownership across four categories of assets: bonds, mutual funds, ETFs, and commodities. Education and income were negatively related to owning annuities. The education effect was negative for cash value life insurance, whereas income was positively associated with owning life insurance. It may be that cash value life



insurance is used by high income households as a tax-deferral tool. It is also possible that cash value life insurance is being used, as designed, less as an investment and more as a way to hedge the unanticipated loss of income resulting from death for high income earners.

Surprisingly, risk tolerance was found to be associated with the probability of security ownership in only two cases: stocks and mutual funds. The relationship was positive, suggesting that those who were willing to take some financial risk were more likely to own these assets. Risk tolerance was not, however, associated with the ownership of other assets. Confidence in the markets was generally not a significant variable in the models; however, those who were confident in the markets were less likely to own mutual funds. On the other hand, those who reported confidence in the markets were more likely to own cash value life insurance. Confidence in the fairness of the markets was shown to have a greater association with the likelihood of owning investments. The relationship with owning ETFs and other investments was positive. The association with owning annuities and cash value life insurance was negative. One explanation for this finding is that those with greater confidence in the fairness of the markets might value the security offered by annuities and life insurance less than the returns offered by ETFs and other investments, including REITs.

The findings related to financial knowledge confidence were mixed. Being under-confident was not significantly associated with ownership in any of the investments. Some over-confidence effects were noted. Those who were over-confident were less likely to hold mutual funds. Over-confident investors were more likely, on the other hand, to own annuities, cash value life insurance, and commodities.

As stand-alone variables, under- and over-confidence showed less importance in the models. The most noteworthy findings related to confidence were in relation to interactions with help-seeking behavior. In fact, sources of investment help were dominant in describing the profile of investors. For five out of the eight investments (i.e., individual bonds, mutual funds, ETFs, cash value life insurance, and commodities), seeking help from a stockbroker and other investment advisor was positively related to the likelihood of owning these investments. This indicates that among investors, these types of investments are a “sold” product, meaning that in addition to other factors, it takes a paid help provider to promote the use of some investments, although it is also possible that those who own these types of investments seek out help from professionals to help manage the investments. Actively sought free help was found to be associated with only one investment asset: individual bonds. A positive association with seeking help from the media and the likelihood of owning stocks, bonds, and other investments was noted. Advice from networks was positively related to the probability of owning annuities and commodities.

The most noteworthy results were related to the interactions between and among knowledge confidence and source of investment help. Consider the situation with individual stock ownership. By itself, being over-confident was not associated with the probability of owning stock. However, when over-confident investors worked with a stockbroker or other financial advisor, the likelihood of owning stocks increased. This hints at the possibility that compared with those with a congruent self-assessment of financial knowledge, over-confident investors are more likely to own individual stocks after working with a financial professional. Over-confidence was also positively associated with seeking help from free sources (i.e., annuities), the media (i.e., cash value life insurance and other investments), and networks

(i.e., individual bonds, ETFs, and cash value life insurance). Recall that the network category included (1) investment clubs or investor membership organizations, (2) employers, and (3) friends, colleagues, or family members. These help providers may serve as a source of confirmation, whereas free and media sources of help may act as promoters of certain investments and behaviors (e.g., purchasing life insurance and other investments, such as hard assets, including real estate and precious metals). Only one negative interaction was noted in relation to being over-confident: obtaining financial help from networks decreased the likelihood of owning individual stocks. Network help providers may dampen demand for stocks among those who are over-confident. Rather than investing in individual stocks, those who were over-confident and working with network help providers were more likely to own other types of risk-bearing investments, such as ETFs.

Whereas no direct under-confidence relationships were found in the models, three interactions were present. Those who were under-confident and working with a stockbroker or financial advisor were less likely to own commodities. Under-confident investors who obtained free advice were less likely to hold cash value life insurance. Finally, the likelihood of owning individual stocks was lower for under-confident investors working with network help providers.

## **6. Implications for financial professionals**

In an ideal world, all financial professionals will seek to improve the financial health of clients by providing cost-effective holistic financial plans that meet client goals and promote long-term financial well-being. Effective communication with clients is essential within the financial planning process (Grable and Goetz, 2017), but so is the ability to recognize the unique characteristics and profile of clients that can be used to anticipate investment preferences. Consider the issue of financial risk tolerance. Although generally thought to be a primary determinant of the type of investments held by investors, in this study, financial risk tolerance was only associated with the ownership of stocks and mutual funds. Other household characteristics were more important in describing an investor's profile.

Investors who exhibited over-confidence in their financial knowledge were more likely to hold annuities, cash value life insurance, and commodities. Over-confident respondents were also less likely to hold mutual funds. Even so, sources of help emerged as a variable of even more relevance. Active fee help providers, which includes financial planners, was found to be important in describing who held bonds, mutual funds, ETFs, cash value life insurance, and commodities. In general, the use of financial planners, and other fee-for-service help providers, appears to promote diversification among investments. The use of media help providers, on the other hand, may create a mindset that focuses on individual holdings of stocks, bonds, and real estate.

The powerful role of help providers was exemplified by the way in which investment ownership was moderated by the type of help provider used by an investor. Those who worked with a fee-for-service help provider exhibited stock ownership. This hints at the positive way in which paid help providers can moderate a client's tendencies. In other words, over-confident clients who seek help from financial planners may benefit from advice to

diversify investments across asset classes. Moderation effects with various types of advice platforms suggests a certain “coachability” associated with over-confidence in investing.

The association between network help providers and over-confident investors provides additional evidence regarding the power of help seeking. Network help providers significantly moderated the effect of being over-confident, but not necessarily in a good way. Over-confident respondents who used the help of networks were less likely to own stocks, but more likely to own bonds, ETFs, and cash value life insurance.

Findings from this study related to under-confident investors indicates a need for additional research. While noting that all respondents in this study reported owning investments outside of retirement plans, under-confidence may indicate a reluctance to invest in assets classes where there is uncertainty of outcomes or unfamiliarity with asset characteristics. The lack of a moderation effect with media-based advice and asset class ownership may point to a reluctance to take such sources of advice seriously. On the other hand, fee-for-service and free help providers may be providing under-confident clients valuable advice. While being under-confident was not directly associated with investment ownership, when moderated by these help providers, under-confident respondents were less likely to report holding cash value life insurance or commodities, indicating that a relationship with a financial professional can potentially be beneficial in helping a client manage portfolio risk.

Because over-confident and under-confident clients are encountered on a regular basis, it behooves financial planners to be able to identify signs of confidence bias and take steps to counteract such biases. A financial planner can increase the value of services offered to a client by steering the over-confident into less risky and lower cost asset classes and by guiding the under-confident into asset classes that fit a more aggressive risk profile but may not be familiar or initially comfortable.

Finally, as with most studies that are exploratory, the results from this study should be evaluated in the context of potential limitations. For example, data for the study were obtained from a pre-existing dataset. Some of the questions asked in the survey may suffer from validity issues. Consider the risk-tolerance measure. As noted by Grable and Schumm (2010), the SCF risk item that is available in the dataset suffers from validity and reliability deficiencies. Future studies ought to consider a more robust measure of client risk tolerance/aversion. Additionally, the questions used to measure financial knowledge, while generally accepted as valid, may have been too trivial as measures of investment knowledge, which could have skewed the estimate of knowledge confidence. Additionally, future studies should attempt to identify the causality of investment ownership. Even in the context of these and other limitations, the results from this study are noteworthy in providing insights into who is more or less likely to hold specific types of investment products. This study shows how understanding an investor’s profile can be used to more precisely match portfolio development needs to a client’s unique situation.

## Note

- 1 A moderator is defined as a variable that affects the direction and/or strength of the relationship between an independent variable and a dependent variable (Baron and Kenny, 1986).

## Appendix Measures of objective financial knowledge

1. In general, investments that are riskier tend to provide higher returns over time than investments with less risk. **True** 76% False 14% Don't know 9%
2. If you buy a company's stock: **(1) You own a part of the company** 73% (2) You have lent money to the company 14% (3) You are liable for the company's debts 1% (4) The company will return your original investment to you with interest 6% (5) Don't know 5%
3. If you buy a company's bond: (1) You own a part of the company 10% **(2) You have lent money to the company** 65% (3) You are liable for the company's debts 4% (4) You can vote on shareholder resolutions 5% (5) Don't know 16%
4. Over the last 20 years in the United States, the best average returns have been generated by: **(1) Stocks** 55% (2) Bonds 8% (3) CDs 2% (4) Money market accounts 6% (5) Precious metals 8% (6) Don't know 19%
5. If a company files for bankruptcy, which of the following securities is most at risk of becoming virtually worthless? (1) The company's preferred stock 13% **(2) The company's common stock** 53% (3) The company's bonds 15% (4) Don't know 19%
6. Which of the following best explains why many municipal bonds pay lower yields than other government bonds? (1) Municipal bonds are lower risk 32% (2) There is a greater demand for municipal bonds 10% **(3) Municipal bonds can be tax-free** 34% (4) Don't know 23%
7. What has been the approximate average annual return of the S&P 500 stock index over the past 20 years (not adjusted for inflation)? (1) -10% 0% (2) -5% 2%, (3) 5% 25%, **(4) 10%** 26% (5) 15% 7%, (6) 20% 4%, (7) Don't know 36%
8. You invest \$500 to buy \$1,000 worth of stock on margin. The value of the stock drops by 50%. You sell it. Approximately how much of your original \$500 investment are you left with in the end? (1) \$500 21% (2) \$250 35% **(3) \$0** 23% (4) Don't know 20%
9. Which is the best definition of "selling short?" (1) Selling shares of a stock shortly after buying it 11% (2) Selling shares of a stock before it has reached its peak 20% (3) Selling shares of a stock at a loss 26% **(4) Selling borrowed shares of a stock** 21% (5) Don't know 22%
10. Which of the following best explains the distinction between nominal returns and real returns? (1) Nominal returns are pre-tax returns; real returns are after-tax returns 12% (2) Nominal returns are what an investment is expected to earn; real returns are what an investment actually earns 21% **(3) Nominal returns are not adjusted for inflation; real returns are adjusted for inflation** 12% (4) Nominal returns are not adjusted for fees and expenses; real returns are adjusted for fees and expenses 9% (5) Don't know 44%

The bold text representing the correct answer and the percentage figure indicating the proportion of respondents who selected a particular answer.

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