Investment Strategies, Personality Traits, and Overconfidence: Evidence from Iran

Review of Integrative Business & Economics Research

Brenda J. Cude*
Department of Financial Planning, Housing, and Consumer Economics, University of Georgia

Swarn Chatterjee
Department of Financial Planning, Housing, and Consumer Economics, University of Georgia

Jamal Tavosi
Department of Management and Economics, University of Sistan and Baluchestan, Zahedan-Iran

ABSTRACT

This paper examines the association between personality traits, overconfidence in one's financial knowledge, and investment strategies among Iranian households. The results indicate that overconfidence is negatively associated with the likelihoods of calculating risk and considering the principle of present and future values in investing. The study also found evidence of the influence of personality traits. Conscientiousness is positively associated with three of the four investment strategies, and extraversion is negatively associated with calculating risk but positively associated with using the principle of present and future values. One's risk tolerance is consistently related to the use of investment strategies.

Keywords: Financial literacy; Investment strategies; Overconfidence; Personality traits.

Received 18 December 2019 | Revised 21 April 2020 | Accepted 1 June 2020.

1. INTRODUCTION

The stock market plays an important role in many individuals' financial lives (Xia, Wang, and Li, 2014). The dynamic nature of the market, coupled with the complexity and uncertainty typically associated with stock market investment, suggests that all else equal, there should be a higher likelihood that individuals with more financial knowledge will invest in the stock market. Indeed, van Rooij, Lusardi, and Alessie (2011), among others, found a positive relationship between financial literacy and stock market participation. Other researchers, including Xia, Wang, and Li (2014), have associated overconfidence in one's financial knowledge with stock market participation, defining overconfidence as a combination of high perceived and low actual financial knowledge. Previous research (see, for example, Baker and Nofsinger, 2010) has suggested that overconfidence can lead to suboptimal decisions. Personality also plays a role in almost every aspect of financial behaviors, including stock market participation (Conlin *et al.*, 2015).

This research examined the roles of financial knowledge, specifically overconfidence in one's financial knowledge, and personality as influences on

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

individuals' investment strategies. Financial knowledge was measured using five questions created by Lusardi and Mitchell (2007) and nine questions specifically about stock market investing taken from van Rooij, Lusardi, and Alessie (2007, 2011). The data are from a unique and proprietary sample of Iranian households who participated in the Tehran Stock Exchange.

2. LITERATURE REVIEW

This section reviews literature related to financial knowledge, overconfidence in one's financial knowledge, and personality traits in relation to investment behaviors.

2.1 Financial Knowledge

The past quarter-century has witnessed the emergence and increased accessibility of sophisticated financial products for consumers, and an increase in financial responsibility for households. Participation in complex financial products requires more financial knowledge. More financially knowledgeable individuals can make better financial decisions, which can result in improved financial well-being over time.

However, many studies have documented that most individuals have inadequate financial knowledge, which is detrimental to their financial well-being over time (Hilgert, Hogarth, and Beverly, 2003; Kim, Anderson, and Seay, 2019; National Council on Economic Education (NCEE), 2005; Palmer *et al*., 2018). Researchers have associated a lack of financial knowledge (or financial illiteracy) with adverse borrowing, saving, and spending patterns. Lusardi, Michaud, and Mitchell (2017) found that differences in financial knowledge explained approximately 30 to 40 percent of the inequality in retirement wealth among U.S. households. Klapper, Lusardi, and van Oudheusden (2015) used four basic knowledge questions to demonstrate that financial knowledge is low in many countries with well-developed financial markets, including the U.S., and especially in some demographic groups, including adults older than 65, women, and the less educated. Bucher-Koenen *et al*. (2017) argued that financial knowledge is perhaps more important for women than men but reported that men were more financially knowledgeable. Lusardi (2015) analyzed the Programme for International Student Assessment (PISA) data, which showed an alarming lack of financial literacy among 15-year-old students in many of the 18 countries where the instrument was administered.

Other research has linked financial literacy to investment behaviors. Extensive literature connects financial literacy with wealth accumulation (Bianchi, 2018; Jappelli and Padula, 2011), including stock market participation (Almenberg and Dreber, 2015; Arrondel, Debbich, and Savignac, 2015; Bannier and Neubert, 2016; Bulloch, Nicolae, and Philip, 2014; Hsiao and Tsai, 2018; Thomas and Spataro, 2018; van Rooij, Lusardi, and Alessie, 2007, 2011). The relationship holds in studies conducted in countries with developing economies – for example, Tunisia (Mouna and Anis, 2017), Lithuania (Mauricas, Darškuvienė, and Mariničevaitė, 2017), China (Zou and Deng, 2019), and India (Sivaramakrishnan, Srivastava, and Rastogi, 2017).

Scant literature has examined the relationship of financial knowledge to specific investment strategies. Arrondel, Debbich, and Savignac's (2015) measure of basic financial knowledge was correlated with stock market participation but did not explain the proportion of stocks held among one's financial assets. Chu *et al*. (2017) found that Chinese investors with more financial literacy tended to delegate at least a portion of their

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

portfolios to experts to manage by investing in mutual funds. Bannier and Neubert (2016) examined both "standard" investments (stocks and mutual funds) and sophisticated investments (discount certificates and hedge funds) and reported that both actual and perceived financial literacy were strongly correlated with standard investments for men; only actual financial literacy significantly influenced standard investments for women. Only perceived financial literacy significantly influenced holding sophisticated investments, and the relationship was stronger for women than men.

As described in Hung, Parker, and Yoong (2009), researchers have used many approaches to measure financial literacy. However, the predominant one that has emerged has been to objectively measure financial knowledge using multiple choice and/or true-false knowledge questions, with some consensus to use the questions Lusardi and Mitchell (2007) created, either alone or in combination with other questions. The second approach is to measure perceived financial knowledge, typically based on a single question (e.g., how much do you think you know…).

2.2 Overconfidence in Financial Knowledge

In part because individuals typically describe their knowledge as higher than their objectively-measured knowledge, researchers also have examined overconfidence in financial knowledge. Overconfidence typically is defined as a combination of high perceived and low actual knowledge (Allgood and Walstad, 2015; Guiso and Jappelli, 2005; Pikulina, Renneboog, and Tobler, 2017; Xia, Wang, and Li, 2014). Overconfidence can either rise (Kramer, 2016) or fall (Tekçe, Yilmaz, and Bildik, 2016) with objectively-measured financial knowledge.

Several studies have shown that overconfidence in one's financial knowledge can lead to suboptimal decisions by investors. Kramer (2016) demonstrated that those with high confidence in their financial knowledge were less likely to seek financial advice; the effect was most pronounced among wealthy households. Overconfident investors are more likely to participate in the stock market than "unconfident" investors (Xia, Wang, and Li, 2014); the risk to one's financial well-being is more pronounced if the overconfident investor has relatively low financial knowledge. Overconfident investors take more risks (Nosić and Weber, 2010). Gervais and Odean (2001) reported that new traders incorrectly develop overconfidence in their ability based on successes and failures, taking too much credit for their successes. Several researchers (Glaser, Lanzer, and Weber, 2005; Guiso and Jappelli, 2005; Haigh and List, 2005; Odean, 1998) have linked excessive trading with overconfidence, leading to lower net returns. In Chu *et al.*'s (2017) research, overconfident investors were more likely to manage their portfolios themselves and to hold only stocks. In contrast to the commonly negative portrayal of overconfidence, research by Parker *et al.* (2012) indicated that confidence (even overconfidence) was associated with positive financial behaviors.

Arifin and Soleha (2019) used a different measure of overconfidence, one based on respondents' self-assessment of their confidence in their knowledge about stocks, ability to analyze stocks, success of stock investments, and accuracy in choosing shares. They reported that among the Indonesian investors in their sample, attitude toward risk influenced overconfidence while financial literacy did not.

Various researchers have established links between demographic characteristics and overconfidence in one's financial knowledge. Several studies (see, for example, Anderson *et al.*, 2012; Lundeburg, Fox, and Punccochaŕ, 1994; Pulford and Colman, 1997; Santos *et al.*, 2010; Tekçe, Yilmaz, and Bildik, 2016; Wu, Johnson, and Sung,

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

2008) have established that there is a gender bias in overconfidence in general and specifically in financial knowledge. Barber and Odean (2001) and Karlsson and Nordĕn (2007) are two of many studies to report that males are more overconfident in their financial knowledge than women.

Research has associated culture with overconfidence in general (Acker and Duck, 2008; Weber and Hsee, 2000; Wu, Johnson, and Sung, 2008; Yates, Lee, and Bush, 1997; Yates *et al*., 1998). Culture may influence an individual's cognitive processes, which may affect her confidence judgments and how she processes information or knowledge (Baker and Nofsinger, 2010). For example, Acker and Duck (2008) showed that Asians are consistently more overconfident than the British. de Zwaan *et al.* (2017), who collected data through an online survey of Australian university students, reported that those for whom English was a second language were more likely to be overconfident in their financial knowledge than their counterparts.

Pak and Chatterjee (2016) examined the relationship of overconfidence in financial knowledge to age. They reported that older investors' financial literacy diminishes with age, thus creating a gap between perceived and actual knowledge that increases with age. Overconfidence was associated with risky asset ownership that was moderated by seeking advice from financial advisors.

2.3 Personality Traits

Research about the influence of personality factors on financial behaviors has produced important insights. Researchers have defined personality traits in a variety of ways, but a common approach is to identify the Big Five Personality Traits (extroversion, agreeableness, conscientiousness, neuroticism (vs. emotional stability), and openness to experience (or intellect)) (Paunonen and Ashton, 2001). Researchers have established a relationship between the Big Five Personality Traits and financial well-being in general (Donnelly, Iyer, and Howell, 2012), saving and borrowing behavior (Nyhus and Webley, 2001), and young adult financial distress (Xu *et al*., 2015).

Several researchers have examined the relationship between personality traits and asset accumulation. Brown and Taylor (2014) reported that openness to experience was associated with a higher probability of holding riskier financial assets. Both extraversion and openness had larger and more positive influences on asset holdings than either conscientiousness or neuroticism. Conscientiousness was associated with the accumulation of net worth in research by Ameriks *et al*. (2004, 2007) and Chatterjee, Palmer, and Goetz (2010), as well as with asset accumulation among young adults in research by Letkiewicz and Fox (2014).

Conlin *et al*. (2015) and Iswari (2020) used different approaches to measure personality. Conlin *et al.* used the Temperament and Character Inventory and reported that the personality traits novelty seeking, reward dependence, and persistence were positively associated with stock market participation. Iswari assessed Type A vs. Type B personalities but found little evidence that personality type influenced accounting students' attitudes toward risky decisions. Lo, Repin, and Steenberger (2005) found that personality traits were not important predictors of trading behavior among day-traders. However, Jalilvand, Noroozabad, and Switzer (2018), who used data from an Iranian sample of investors, suggested the influence of behavioral variables such as personality was stronger among uninformed investors.

2.4 Other Factors

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Mauricas, Darškuvienė, and Mariničevaitė (2017) included the use of financial advisors as a variable in their research about stock market participation. Sources of financial advice likely vary with the financial situation as well as culture. For example, Grable and Joo (2001) described those seeking professional help as having higher financial risk tolerance, better financial behaviors, being homeowners and older, and having more financial satisfaction. They indicated that individuals who chose not to seek financial advice or sought it from non-professionals (family and friends) were more likely to engage in risky borrowing behaviors than their counterparts. However, this study was conducted in the U.S. and may or may not be relevant to other cultures.

van Rooij, Alessi, and Lusardi (2007, 2011) identified the importance of financial advice sources. They used data from the Netherlands to examine financial literacy and stock market participation. One set of questions asked respondents about their most important sources of advice when making financial decisions for the household. Around 40% of those with the lowest financial literacy quartile relied on parents, friends, or acquaintances, while around 25% of those in the highest financial literacy quartile sought advice from professional financial advisors. The financial advice-seeking sources used in the current study paralleled those in van Rooij, Lusardi, and Alessie (2007, 2011).

In addition to sources of financial advice, the current study included four other control variables (investment risk tolerance, investment experience, investment horizon, and financial or investment education) selected based on previous research. Corter and Chen (2006), among others, have identified the role that risk tolerance plays in investment behaviors. Dobni and Racine (2016) used investment experience as a control variable in their research examining investors' stock market images. Investment horizon also was a control variable; Veld-Merkoulova (2011) reported that those with a longer investment planning horizon also held a larger share of risky financial investments. Although it has proven difficult to demonstrate an effect of financial or investor education separately from education, several researchers have included a variable to account for education specific to financial management in their analyses. For example, Grimes, Rogers, and Smith (2010) demonstrated that students exposed to high school economics or business courses were more likely to use basic financial services. Cole, Paulson, and Shastry (2013), however, found no effect of high school personal finance courses on financial outcomes.

Finally, previous research about investment behaviors included demographic control variables. Commonly included were gender, marital status, education, income, age, and employment status (Charness and Gneezy, 2012; Lusardi, de Bassa Scheresberg, and Oggero, 2014; Poterba, Venti, and Wise, 2013).

This study's goal was to examine the influence of overconfidence in one's financial knowledge and one's personality traits on investment strategies. The next section describes the methodology.

3. METHODS

3.1 Data Description

The study used a convenience sample of 296 respondents who were investors in the Tehran Stock Exchange (TSE). A co-author distributed paper copies of the survey, written in Persian/Farsi, in the TSE during trading days (Saturdays through Wednesdays), primarily during non-trading hours between January 2016 and May 2017. The screening criteria limited respondents to those ages 20 to 80 years old who had more than one trade on the exchange. The survey, which was created by the co-author who is a native of Iran,

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

asked for information about the participants' objective and subjective financial literacy, their investment strategies, and their personality traits. Additionally, the survey included questions about the participants' demographic characteristics and the control variables.

3.2 Variables

3.2.1 Dependent Variable

The dependent variable measured investment strategies. The items were adapted from Xia, Chen, and Chen (2013). The survey asked respondents to indicate whether they used each of four investment strategies:

IS1: I use the power of diversification in my investments.

IS2: I use calculated risks in my investing strategies.

IS3: I use the principle of risk vs. return in my portfolio.

IS4: I use the principle of present and future value in my investment calculations.

Each investment strategy variable was constructed as a binary variable coded as 1 if the respondent used that strategy and 0 otherwise.

3.2.2 Independent Variables

The primary independent variables were overconfidence in one's financial knowledge and personality traits. To construct the overconfidence variable, both objective and subjective financial knowledge were measured. Objective financial knowledge was measured based on two previously-used approaches. Five questions (based on Lusardi and Mitchell, 2007; see Appendix) measured basic financial knowledge. Nine questions, adapted from van Rooij, Lusardi, and Alessie (2007, 2011) and modified to fit the Iranian financial context (see Appendix), measured advanced financial knowledge specific to investing in the stock market. Each respondent was assigned a score of 1 for each correct response and 0 otherwise, including don't know responses and refusals. Taken together, the theoretical objective financial knowledge score ranged from 0 to 14.

Following van Rooij, Lusardi, and Alessie (2011), subjective or perceived financial knowledge was measured using responses to the following question: "How do you rate your or your family's understanding of the following financial investment types?" The instrument types were stocks, mutual funds, corporate bonds, derivatives, and index mutual funds. Ratings were on a scale of 1 to 5, where 1 was "not familiar" and 5 was "very familiar." The theoretical score range was from 5 to 25.

The objective and subjective financial knowledge scores were used to assign investors to one of the four categories created by Allgood and Walstad (2015): Perceived Hi (self-rating > mean)/Actual Hi (objective knowledge score > mean); Perceived Lo (self-rating < mean)/Actual Hi (objective knowledge score > mean); Perceived Hi (self-rating > man)/Actual Lo (Objective knowledge score < mean) (Overconfident); and Perceived Lo (self-rating < mean)/Actual Lo (Objective knowledge score < mean). A dummy variable for overconfidence was created; those in the Perceived Hi/Actual Lo group were coded as 1 and all others as 0.

The Big Five Personality Traits, a well-established approach, were used to assess personality types (McCrae and John, 1992). Researchers have used a variety of instruments to measure the Big Five; this research used the NEO-FFI (NEO Five-Factor Inventory), a 60-item instrument. Each of the five personality traits was assessed based on 12 questions. The responses were on a five-item Likert scale, ranging from "strongly

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

disagree" (1) to "strongly agree" (5). The constructed measures for each personality trait could range from 12 to 60.

Table 1 describes the measures for each of the independent variables. The Big Five Personality traits were continuous variables; for each, a higher score indicated greater strength in that trait. For the logistic regression, the variables gender, age, marital status, education, income, employment, investment risk tolerance, financial or investment education, and trading experience were coded as binary variables. Financial advice-seeking sources and investment horizon were categorical variables.

4. ANALYSES

Empirical Model

t-tests and Chi Square analyses were used to identify significant differences in the demographic characteristics of respondents engaged in each of the investment strategies. Given the binary nature of the dependent variables, logistic regression was used (Woolridge, 2010) to examine the influence of overconfidence in one's financial knowledge and personality traits on the four investment strategies, controlling for investment risk tolerance, sources of financial advice, investment horizon, financial or investment education, trading experience, and selected demographic characteristics. The empirical model for this study is shown below:

$$IS_i = f(OC, PT, D) \quad (1)$$

where, IS_i are binary variables for the four investment strategies:

IS1= Using the power of diversification in investments (1=YES; 0=Otherwise)
IS2= Calculating risks as an investment strategy (1=YES; 0=Otherwise)
IS3=Using the principle of risk vs. return in one's portfolio (1=YES; 0=Otherwise)
IS4=Using the principle of present and future values in investment calculations (1=YES; 0=Otherwise)
OC=Overconfidence in one's financial knowledge (1=YES; 0=Otherwise)
PT=Vector of the personality trait variables
D=Vector of other control variables

Table 1: *Variables and descriptions*

Variable	Variable Description
Overconfidence in one's financial knowledge	Binary: 1 if Perceived Hi/Actual Lo financial knowledge, 0 if otherwise
Investment strategies	(IS1): Used power of diversification; (IS2): Calculated risk in investment strategy; (IS3): Used principle of risk vs. return in portfolio; (IS4): Used principle of present and future value in investment
Objective financial knowledge	Objective financial knowledge score (range 0–14). See Appendix
Subjective financial knowledge	Subjective financial knowledge (range 5-25). See Appendix
Gender	Binary: 1 if male, 0 if female
Age	Binary: 1 if 30 years or older, 0 otherwise

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Marital status	Binary: 1 if married, 0 otherwise
Education	Binary: 1 if completed a college degree; 0 if not
Monthly income	Binary: 1 if greater than or equal to US$300, 0 otherwise
Employment	Binary: 1 if public sector, 0 if otherwise
Risk tolerance	Binary: 1 if has an investment with more risk than a savings account, 0 if otherwise
Financial advice-seeking sources	Categorical: Parents and friends; Newspapers and books; Information from financial professional advisors
Investment horizon	Categorical: Short-term (daily and weekly), mid-term (monthly and quarterly), long-term (annually)
Financial or investment education	Binary: 1 if No, 0 if yes
Trading experience	Binary: 1 if one year or more, 0 otherwise
Personality traits	Neuroticism, openness, conscientiousness, agreeableness, and extraversion, measured using 60 items with responses on a 5-level Likert scale ranging from ‘‘strongly disagree” (1) to ‘‘strongly agree” (5)

5. RESULTS

5.1 Descriptive Statistics

Table 2 describes the demographic characteristics for the overall sample and the percentages of respondents practicing each investment strategy. Overall, 64% of the respondents used at least one of the four investment strategies. The most commonly used investment strategy was incorporating the principle of present and future value (IS3 - 52%).

The overall sample included more males (63%) than females (37%) and was more often 30 years or older (63%), and married (56%). One-quarter had earned a college degree. The majority of the respondents earned a monthly income of US$300 or more (84%); 43% were employed in the public sector.[1] Just less than three-quarters of the sample (72%) sought financial advice from parents and friends; 22% read books and newspapers for financial information, but only 5.9% sought advice from professional advisors. Just more than one-half (54.8%) had invested in an instrument with more perceived risk than an Iranian savings account. Only 13% described their investment horizon as long-term, compared to 55% who chose short-term and 32% who chose mid-term. More than two-thirds (68%) reported receiving some form of financial or investor education, and about 56% of the respondents had trading experience of a year or more.

[1] The remaining respondents indicated they were employed in the private sector, students, retired, or chose “other.” The survey did not ask respondents for the additional information that would increase understanding about the labor force status of the 51 respondents who chose “other” as their response. Anecdotal evidence suggested that many in this group may have been entrepreneurs or otherwise not engaged in the formal labor force.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Table 2: *Descriptive statistics*

		Power of diversification (IS1)	Calculated risk in investment strategy (IS2)	Principle of risk vs. return in portfolio (IS3)	Principle of present and future value in investment (IS4)
Variables	%	%	%	%	%
Practiced investment behavior	63.9	30.4	31.8	30.7	52.1
Overconfidence	17.9	15.3	14.6	15.1	9.5
t-test		0.737	6.967**	0.795	5.79***
Gender					
Male	62.8	64.7	63.5	65.0	63.7
Female	37.2	35.3	36.5	35.0	36.3
t-test		0.582	0.558	1.684**	0.556
Age					
Younger than 30 years	36.8	31.8	34.8	39.0	37.1
30 years or older	63.2	68.2	65.2	61.0	62.9
t-test		1.849**	1.461**	1.118**	0.815
Marital status					
Not married	44.3	38.9	42.9	42.2	54.2
Married	55.7	61.1	57.1	57.8	45.8
t-test		2.179**	0.612	1.219*	0.018
Education					
Less than a college degree	75.0	60.0	73.0	61.8	77.4
Has a college degree	25.0	40.0	27.0	38.2	22.6
t-test		3.912***	0.517	3.469***	1.798*
Monthly income					
Less than US$300	16.1	5.6	5.6	23.4	25.3
US$300 or more	83.9	94.4	94.4	76.6	74.7
t-test		0.201	0.081	1.311*	1.709**

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Employment					
Public sector	42.2	38.9	36.0	36.0	43.2
Other sectors	56.8	61.1	64.0	64.0	56.8
t-test		1.864**	0.442	0.331	0.223
Investment risk tolerance	54.8	59.1	67.2	69.7	71.9
t-test		3.159***	3.734***	4.551***	7.441***
Financial advice-seeking sources					
Parents and friends	72.0	63.1	56.8	50.8	64.2
Newspapers and books	22.2	29.2	29.7	37.7	29.2
Professional financial advisors	5.9	7.7	13.5	11.5	6.7
Chi Square		3.497	16.928***	18.409***	7.612**
Investment horizon					
Short-term	54.7	38.9	37.6	39.1	56.6
Mid-term	32.2	50.0	47.1	46.9	28.9
Long-term	13.1	11.1	15.3	14.1	14.5
Chi Square		4.043	14.430***	8.472	7.637
Financial or investment education					
Yes	67.5	77.8	77.8	71.9	71.1
No	32.5	22.2	22.2	28.1	28.9
t-test		3.231***	3.557***	2.931**	2.331**
Trading experience					
1 year or less	55.8	55.6	55.6	56.3	72.5
More than 1 year	44.2	44.4	44.4	43.7	29.5
t-test		0.993	0.889	0.853	1.091*

*p<0.05; **p<0.01; ***p<0.00

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

There were differences in the characteristics of those who used each of the investment strategies. Significantly larger proportions of men than women engaged in IS3 (risk vs. return) ($t=1.684$, $p<0.01$). Significantly larger proportions of older respondents considered diversification in choosing assets (IS1), calculated risk (IS2), and used the principle of risk vs. return in their portfolios (IS3). Higher percentages of married than not married respondents considered diversification (IS1) and used the principle of risk vs. return (IS3). Significantly higher proportions with less education reported using each of the investment strategies except IS2 (calculating risk). Compared to the overall sample, where 84% of the respondents reported a monthly income of US$300 or more, significantly more respondents with higher incomes practiced IS3 (risk vs. return) and IS4 (present and future value). A larger proportion of those not employed in the public sector engaged in IS1 (diversification).

Higher proportions of those more willing to take investment risk practiced each of the four investment strategies. Chi-square analyses indicated there was a relationship between the source of financial advice and each investment strategy except diversification (IS1). There also was a relationship between one's investment horizon and calculating risk (IS2). Significantly higher proportions of respondents who reported financial or investment education engaged in each of the four investment strategies. Finally, while a higher proportion (55.8%) reported trading experience of less than one year than more than one year, there were no significant differences in the investment strategies used based on trading experience.

Relative to the proportions in the overall sample, a significantly higher percentage of those who reported they followed IS1 (the power of diversification) were 30 years old or older, married, had less education than a college degree, were not employed in the public sector, were willing to take investment risks, and had received financial or investment education. Relative to the proportions in the overall sample, a higher proportion of those who reported they used IS2 (calculating risk) were overconfident, were 30 years old or older, were willing to take investment risk, sought financial advice from parents and friends, had a mid-term investment horizon, and had received financial or investment education. Relative to the proportions in the overall sample, a higher percentage of those who reported they used IS3 (the principle of risk and return) were male, married, 30 years old or older, had less education than a college degree, had incomes more than US$300 annually, sought financial advice from parents or friends, were willing to take investment risk, and had received financial or investment education. Relative to the proportion in the overall sample, a higher percentage of those who reported using IS4 (principle of present and future values) were overconfident, had less education than a college degree, had incomes more than US$300 annually, were willing to take investment risks, received financial advice from parents and friends, and had received financial or investment education. Overall, the variables with the most consistent influence on the use of investment strategies were risk tolerance, age, education, sources of financial advice, and financial or investment education.

Table 3 reports a summary of correct and incorrect responses to the objective investment knowledge questions. The mean score on the five basic financial knowledge questions was 2.21 (40%), and 6.08 (67%) on the nine advanced financial knowledge questions. More than one-half of the sample answered three (numeracy, inflation, and money illusion) of the five basic financial knowledge questions correctly. Only 11.1% correctly answered the compound interest question, and just 19.1% correctly answered the time value of money question. The results indicated that Iranian individuals are far

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

less financially literate than the respondents in other studies that used these measures. Lusardi and Mitchell (2007) reported the mean response to the compound interest question in the U.S. was 67.1% and ranged from a low of 35.2% in Sweden to a high of 86.0% in New Zealand among the 12 countries in which this question has been asked. The mean response to the inflation question in the U.S. was 75.2% and ranged from 31.8% in Romania to 81.0% in New Zealand. Lusardi and Mitchel (2007) reported mean scores of 77.2% or more across five questions in a sample of U.S. adults.

Table 3: *Correct responses to financial knowledge questions*

	% Correct
Objective Financial Knowledge	
1. Numeracy	57.0
2. Compound interest	11.1
3. Inflation	55.0
4. Time value of money	19.1
5. Money illusion	51.0
Advanced Financial Knowledge	
1. Function of stock market	16.1
2. Definition of stock	69.5
3. Mutual funds	6.0
4. Fluctuation in financial assets	9.7
5. Portfolio diversification	7.0
6. Supply of money in the economy	22.5
7. Stock vs. corporate bond	59.4
8. Risk vs. return	16.8
9. P/E ratio	65.8

Mean objective financial knowledge score= 2.21
Mean investment financial knowledge score=6.08

More than 50% correctly answered three of the investment knowledge questions: the differences between stocks and corporate bonds and the definitions of a stock and a price-to-earnings (P/E) ratio. Fewer than 10% correctly answered three other knowledge questions specific to investing—definition of a mutual fund,[2] fluctuations in financial asset returns, and portfolio diversification.

Many factors, including general educational levels, financial education strategies, opportunities to apply financial knowledge in the market, as well as how financial knowledge is measured, may explain differences between countries' financial knowledge. However, de Beckker, de Witte, and van Campenhout (2020) emphasized the role of natural culture, reporting that financial literacy is higher in countries with a more uncertainty-avoiding culture than in countries where the culture is more individualistic. Scores on the Hofsted Cultural Dimensions Scale are relative; for example, Borker (2014) reported that Iran's scores on individualism were much lower than in the U.S. but higher for uncertainty-avoidance.

Table 4 reports the correlations for the investment strategies and personality traits. IS1 (diversification), IS2 (calculation of risk), and IS3 (principle of risk vs. return) were correlated with all five personality traits, while IS4 (present vs. future value) was correlated only with agreeableness and conscientiousness. The summary statistics

[2] According to one report, 194 mutual funds are registered in Iran (Hojjatnia, 2018).

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

indicated that IS1 had the strongest correlation with agreeableness (37%), IS2 with neuroticism, IS3 with openness and agreeableness, and IS4 with conscientiousness. Overall, the correlations between the personality traits and investment behaviors were low.

Table 4: *Binary correlations between investment strategies and personality traits*

	Personality Traits				
Investment Strategies	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
Power of diversification (IS1)	0.244***	0.258***	0.276***	0.365***	0.301***
Calculated risk (IS2)	0.216***	0.114**	0.106**	0.141***	0.136***
Principle of risk vs. return (IS3)	0.111**	0.072*	0.169***	0.170***	0.154***
Principle of present and future value (IS4)	0.026	0.000	0.033	0.072*	0.098**

*p<0.05; **p<0.01; ***p<0.001

5.2 Association between overconfidence, personality traits, and investment strategies

Table 5 reports the results of the logistic regression analyses examining the association between overconfidence in one's financial knowledge and investment strategies. The R^2's for the four regression analyses ranged from 0.239 to 0.392 and were lowest for IS1 (diversification) and IS2 (calculating risk). The Variance Inflation
Factors all were less than 4, indicating no evidence of multicollinearity (Woolridge, 2010).

The results indicated that overconfidence was significantly and negatively associated with two of the four investment strategies – IS2 (calculating risk) (odds=0.794; p<0.05) and IS4 (present and future value) (odds=0.791; p<0.01). Several of the personality traits were significantly associated with the four investment strategies. Conscientiousness was positively associated with each strategy except IS1 (diversification). Neuroticism was negatively and significantly related to diversification. Extraversion was negatively associated with IS2 (calculating risk) but positively associated with IS4 (present and future value). Neither agreeableness nor openness was significantly associated with any of the investment strategies.

Among the demographic variables, gender was positively associated with IS3 (risk v. return). Age was positively associated with IS1 (diversification) and IS2 (calculating risk) but negatively associated with IS3 (risk v. return). Marital status and education were positively associated with IS1 (diversification) and IS3 (risk vs. return). Income was negatively associated with IS1 (diversification) and IS2 (calculating risk) but positively associated with IS3 (risk vs. return). Employment was negatively associated with IS1 (diversification). None of the demographic characteristics were significant in the regression for IS4 (present and future value).

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Table 5: *Logistic regressions of investment strategies*

	Power of diversification (IS1)			**Calculated risk (IS2)**			**Risk vs. return (IS3)**			**Present vs. future value (IS4)**		
Variables	Coefficient	S.E	Odds ratio	Coefficient	S.E	Odds ratio	Coefficient	S.E	Odds ratio	Coefficient	S.E	Odds ratio
Overconfidence	-0.124	0.346	0.882	-0.231*	0.119	0.794	0.144	0.411	1.155	-0.233**	0.099	0.791
Personality												
Neuroticism	-0.259**	0.113	0.763	0.322	0.429	1.397	-0.169	0.207	0.844	1.465	1.006	4.332
Extraversion	0.065	0.240	1.067	-0.491**	0.179	0.537	-0.064	0.251	0.938	2.207***	0.291	9.096
Openness	-0.032	0.012	0.967	-0.248	0.383	0.757	0.010	0.208	1.010	0.269	0.672	1.309
Agreeableness	0.232	0.244	1.261	-0.149	0.417	0.859	0.195	0.225	0.823	-0.518	0.585	0.596
Conscientiousness	0.088	0.257	1.092	0.634***	0.215	2.451	0.396*	0.158	1.487	1.158***	0.135	3.158
Gender (Ref: Female)	-0.226	0.300	0.798	-0.076	0.308	0.926	1.030**	0.498	2.801	-0.836	1.218	0.433
Age (Ref: Younger than 30 years)	0.528*	0.249	1.696	0.984***	0.362	2.675	-2.464***	0.639	0.085	-1.048	1.030	0.351
Married (Ref: Not married)	0.624*	0.341	1.868	0.146	0.333	1.157	1.596***	0.540	4.934	-1.527	1.334	0.217
Education (Ref: College degree)	0.692***	0.212	1.998	0.178	0.413	1.194	0.218***	0.058	1.344	-0.155	1.443	0.856
Income (Ref: Less than US$300)	-0.976***	0.357	0.377	-1.058*	0.499	0.349	0.633***	0.215	1.883	0.150	0.448	1.161
Employment (Ref: other sectors)	-0.509*	0.323	0.601	-0.498	0.543	0.608	0.439	0.519	1.551	0.959	0.983	2.609
Investment risk tolerance	3.313***	0.633	11.528	2.362***	0.453	10.622	3.307***	0.594	27.321	2.495***	1.161	12.128

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Table 5 *Logistic regressions of investment strategies (continue)*

Financial advice-seeking sources (Ref: Professional advisors)												
Parents and friends	0.675*	0.307	0.509	-0.432*	0.485	0.649	-1.546***	0.539	0.213	0.379***	0.122	3.531
Newspapers and books	-0.709*	0.331	0.492	-0.022	0.456	0.977	-2.377***	0.607	0.093	0.757**	0.251	5.434
Investment horizon (Ref: Long-term)												
Short-term	-0.025	0.344	0.976	-0.084	0.354	0.919	-0.365	0.752	0.694	0.613	1.134	1.845
Mid-term	-0.352	0.365	0.703	-0.170	0.376	0.844	1.636**	0.808	5.133	-1.609	1.537	0.223
Finance or investment education (Ref: Yes)	0.422***	0.113	1.533	-0.166	0.351	0.847	-0.371***	0.053	1.441	0.119	1.120	1.125
Trading experience (Ref: Less than 1 year)	-0.189	0.112	0.797	-0.139	0.221	0.869	-0.301	0.223	0.740	0.167	0.152	1.182
Intercept	3.975**	1.139		2.543*	0.994		0.497***	0.105		-20.291***	2.043	
Pseudo R- square		0.239			0.2353			0.392			0.319	

*p<0.05, **p<0.01, ***p<0.001

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Each of the control variables except investment horizon and trading experience was significantly related to at least one investment strategy. One's risk tolerance was positively associated with each strategy. Seeking the financial advice of parents and friends (relative to advice from professionals) was negatively associated with IS1 (diversification), IS2 (calculating risk), and IS3 (risk vs. return) but positively associated with IS4 (present and future value). Reading newspapers and books for financial advice (relative to seeking advice from professionals) was negatively associated with IS1 (diversification) and IS3 (risk vs. return). Compared to those respondents who had long-term investment horizons, a mid-term investment horizon was positively associated with IS3. Receiving financial or investment education was positively associated with IS1 (diversification) and IS3 (risk vs. return).

Overall, the largest effect sizes for each of the investment strategies were for the risk tolerance variable. However, the effect sizes for personality traits were quite large for IS4 (present and future value), especially for extraversion.

6. DISCUSSION

This paper explored the association between overconfidence in financial knowledge, personality traits, and investment strategies among Iranian investors. Consistent with previous research, in this study, overconfidence was associated with suboptimal investment decision making (Baker and Nofsinger, 2010; Xia, Wang, and Li, 2014). Also, similar to other studies, which have found that overconfident investors tend to ignore risk in a portfolio (Pan and Statman, 2012; Yates *et al.*, 1998), in this study, the overconfident respondents were less likely to calculate risk or to incorporate the principle of present vs. future value in building an investment portfolio than those who were not overconfident. Barber and Odean (2001) have associated overconfidence with lower cognitive ability.

To our knowledge, no previous studies have controlled for personality traits when examining the association between overconfidence and investment strategies. Consistent with previous research (Ameriks *et al*., 2004, 2007; Chatterjee, Palmer, and Goetz, 2010; and Letkiewicz and Fox, 2014), conscientiousness was positively associated with three of the four investment strategies. Normative approaches to long-term investing that require deliberate planning and consideration likely appeal to those who demonstrate the conscientiousness personality trait.

In this study, neuroticism was negatively associated with IS1 (diversification), and extraversion was negatively associated with IS2 (risk vs. return) but positively associated with IS4 (present and future value). In previous studies, extraversion and neuroticism were the two personality traits most frequently associated with individual investment behavior (Lo, Repin, and Steenbarger, 2005; Oehler *et al.*, 2018). In previous research, Oehler and Wedlich (2018) reported that respondents who exhibited the neuroticism personality trait were more risk averse and less likely to own investable assets. Respondents who exhibited the extraversion personality trait were more likely to take investment risks.

In previous research, men were more likely to engage in risky financial behavior than women (Charness and Gneezy, 2012; Lusardi, de Bassa Scheresberg, and Oggero, 2014). In the current study, males were more likely to use only one of the four investment

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

strategies (considering risk vs. return). The inclusion of the overconfidence variable in this study may have dampened the gender effect.

Investors more than 30 years old were more likely to calculate risks (IS2) but less likely to compare risk vs. return (IS3). These mixed results warrant further investigation, especially to examine the interaction of overconfidence and risk tolerance in different sectors of Iranian investors.

The respondents in this study were highly-educated Iranian investors. Perhaps this explains why education was a significant influence for only two of the four strategies (IS1 and IS3). Previous research has found a positive association between education and investment asset holdings (Poterba, Venti, and Wise, 2013). However, there was much more diversity in the educational achievement of respondents in previous samples.

Investment risk tolerance was a significant influence on the use of investment strategies. The relationship was positive, suggesting that even Iranians with a high risk tolerance use strategies to manage risk. However, future researchers should replace the single question measure with a validated scale, such as the one Corter and Chen used (2006).

Previous studies indicated that seeking professional financial advice is positively associated with better household financial decision making and outcomes (Marsden, Zick, and Mayer, 2011; Robb, Babiarz, and Woodyard, 2012). The results from the current study indicated that compared to the reference group of respondents who sought professional financial advice, those who sought advice from their parents and friends or newspapers and books were less likely to engage in three of the investment strategies, but more likely to compare present vs. future value (IS4), perhaps the most sophisticated strategy of the four. More research is needed to understand the positive association between IS4 and advice from nonprofessionals; including a definition of financial advisor in the survey question is recommended.

Financial or investment education was a significant (and positive) influence only on the use of diversification as an investment strategy (IS1) and comparing risk vs. return (IS3). This result may reflect the general nature of most Iranian financial or investment education, which may not include detailed information about specific investment strategies.

7. FUTURE DIRECTIONS

This study's goal was to examine the influence of overconfidence in one's financial knowledge and personality traits on the use of investment strategies. The study provides evidence that overconfidence is associated negatively with two essential investment strategies – calculating risk and considering present vs. future values. The results also support an association between personality traits, especially conscientiousness, and investment strategies. The results are consistent with previous research, including Conlin *et al*. (2015). Future research should examine the association between personality traits and overconfidence in investment decisions in greater detail.

Future research should be designed to overcome the limitations of this study. A larger sample would provide greater diversity. The subjective financial knowledge measure was worded to ask the respondent about "your or your family's understanding" of the five investment types. A statement that eliminates "your family" might produce different results. Including a direct measure of risk tolerance might provide useful insights. Finally, instruments to measure financial knowledge and investment strategies crafted to be specific to the Iranian environment could be useful, even though the results

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

could not be compared to those from standard measures such as those used in this research.

The findings from this study provide a unique insight into Iranian investor behavior, which is governed by Islamic financial regulations and influenced by Iranian culture. Additionally, this is one of the first studies to examine the association between overconfidence and investor behavior after controlling for personality traits.

APPENDIX

Basic Financial Knowledge Questions

Numeracy 1) Suppose you had 100 in a savings account and the interest rate was 2 percent per year. After five years, how much do you think you would have in the account if you left the money to grow? a) **More than 102** b) Exactly 102 c) Less than 102 d) Do not know e) Refusal
Compound interest 2) Suppose you had 100 in a savings account and the interest rate is 20 percent per year and you never withdraw money or interest payments. After five years, how much would you have on this account in total? a) **More than 200** b) Exactly 200 c) Less than 200 d) Do not know e) Refusal
Inflation 3) Imagine that the interest rate on your savings account was 1 percent per year and inflation was 2 percent per year. After one year, would you be able to buy more than, exactly the same as, or less than today with the money in this account? a) More than today b) Exactly the same as today c) **Less than today** d) Do not know e) Refusal
Time value of money 4) Assume a friend inherits 10,000 today and his sibling inherits 10,000 3 years from now. Who is richer because of the inheritance? a) **My friend** b) His sibling c) They are equally rich d) Do not know e) Refusal
Money illusion 5) Suppose that in the year 2010, your income has doubled and prices of all goods have doubled too. In 2010, how much will you be able to buy with your income? a) More than today b) **The same** b) Less than today d) Do not know e) Refusal

Advanced Financial Knowledge Questions

Function of stock market 6) Which of the following statements describes the main function of the stock market? a)The stock market helps to predict stock earnings b) The stock market results in an increase in the price of stocks **c)The stock market brings people who want to buy stocks together with those who want to sell stocks** d) None of the above e) Don't know f) Refusal

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Definition of stock

7) Which of the following statements is correct? If somebody buys the stock of firm B in the stock market:
   a) **He owns a part of firm B** b) He has lent money to firm B c)He is liable for firm B's debts
   d) None of the above e) Don't know f) Refusal

Mutual funds

8) Which of the following statements is correct?
   a) Once one invests in a mutual fund, one cannot withdraw the money in the first year
   b) **Mutual funds can invest in several assets, for example invest in both stocks and bonds**
   c) Mutual funds pay a guaranteed rate of return which depends on their past performance
   d) None of the above e) Don't know f) Refusal

Risk vs. return

9) Considering a long time period (for example 10 or 20 years), which asset normally gives the highest return?
   a) Savings account b) Bonds **c) Stocks**
   d) Don't know e) Refusal

Fluctuations in financial assets

10) Normally, which asset displays the highest fluctuations over time?
   a) Savings account b) Bonds **c) Stocks**
   d) Don't know e) Refusal

Portfolio diversification

11) When an investor spreads his money among different assets, does the risk of losing money
   a) Increase **b) Decrease** c) Stay the same
   d) Don't know e) Refusal

Supply of money in the economy

12) If the banks' reserve rate decreases, what would be happen to the supply of money in the economy?
   a) **Increase** b) Decrease c) Stay the same
   d) Don't know e) Refusal

Stock vs. corporate bond

13) Stocks are normally riskier than corporate bonds. True or False?
   a) True b) False
   c) Don't know d) Refusal

P/E ratio

14) The P/E ratio reflects relationship between price and earning per share. True or False?
   a) True b) False
   c) Don't know d) Refusal

Correct responses in bold

REFERENCES

[1] Acker, D., and N.W. Duck, (2008), "Cross-Cultural Overconfidence and Biased Self-Attribution," *Journal of Soci-Economics*, 37, 1815-1824. https://doi.org/10.1016/j.socec.2007.12.003

[2] Allgood, S., and W.B. Walstad, (2015), "The Effect of Perceived and Actual Financial Literacy on Financial Behaviors," *Economic Inquiry*, 54(1), 675-697. doi: 10.1111/ecin.12255

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

[3] Almenberg, J., and A. Dreber, (2015), "Gender Stock Market Participation and Financial Literacy," *Economics Letters,* 137, 140-142. https://doi.org/10.1016/j.econlet.2015.10.009
[4] Ameriks, J., A. Caplin, J.V. Leahy, and T. Tyler, (2004), *Measuring Self-Control,* NBER Working Paper No. 10514, Cambridge, MA: National Bureau of Economic Research. Retrieved 9 August 2019 from https://www.nber.org/papers/w10514
[5] Ameriks, J., A. Caplin, J.V. Leahy, and T. Tyler, (2007), "Measuring Self-Control Problems," *The American Economic Review*, 97, 966-972. doi: 10.1257/aer.97.3.966
[6] Anderson, C., S. Brion, D.A. Moore, and J.A. Kennedy, (2012), "A Status-Enhancement Account of Overconfidence," *Journal of Personality and Social Psychology*, 103, 718-735. doi:10.1037/a0029395
[7] Arifin, Z., and E. Soleha, (2019), "Overconfidence, Attitude toward Risk, and Financial Literacy: A Case in Indonesian Stock Exchange," *Review of Integrated Business and Economics Research,* 8(Supplementary 4), 144-152.
[8] Arrondel, L., M. Debbich, and F. Savignac, (2015), "Stock Holding in France: The Role of Financial Literacy and Information," *Applied Economics Letters,* 22, 1315-1319. https://doi.org/10.1080/13504851.2015.1026578
[9] Baker, H.K., and J.R. Nofsinger (Eds.), (2010), *Behavioral Finance: Investors, Corporations, and Markets,* Hoboken, NJ: John Wiley and Sons, Inc.
[10] Bannier, C., and M. Neubert, (2016), "Gender Differences in Financial Risk-Taking: The Role of Financial Literacy and Risk Tolerance," *Economics Letters,* 145, 130-135. https://doi.org/10.1016/j.econlet.2016.05.033
[11] Barber, B., and T. Odean, (2001), "Boys Will Be Boys: Gender, Overconfidence, and Common Stock Investment," *Quarterly Journal of Economics,* 116(1), 261-292.
[12] Bianchi, M., (2018), "Financial Literacy and Portfolio Dynamics," *The Journal of Finance*, 73, 831-859. doi: 10.1111/jofi.12605
[13] Borker, D., (2014), "IFRS and Socio-Orientation in Egypt, Iran, and Iraq," *Journal of Accounting and Finance, 14*(5), 175-185.
[14] Brown, S., and K. Taylor, (2014), "Household Finances and the 'Big Five' Personality Traits," *Journal of Economic Psychology*, 45, 197–212. https://doi.org/10.1016/j.joep.2014.10.006
[15] Bucher-Koenen, T., A. Lusardi, R.J.M Alessie, and M.C.J. van Rooij, (2017), "How Financially Literate Are Women? An Overview and New Insights," *Journal of Consumer Affairs,* 51(2), 255-283. https://doi.org/10.1111/joca.12121
[16] Bulloch, A., A. Nicolae, and D. Philip, (2014), "Stock Market Literacy, Trust, and Participation," *Review of Finance,* 19, 1925-1963. doi:10.1093/rof/rfu40
[17] Charness, G., and U. Gneezy, (2012), "Strong Evidence for Gender Differences in Risk Taking," *Journal of Economic Behavior and Organization*, 83(1), 50-58. https://doi.org/10.1016/j.jebo.2011.06.007
[18] Chatterjee, S., L. Palmer, and J. Goetz, (2010), "Individual Wealth Accumulation: Why Does Dining Together as a Family Matter?" *Applied Economic Research Bulletin,* 8(1), 1-22. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2596371
[19] Chu, Z., Z. Wang, J.J. Xiao, and W. Zhang, (2017), "Financial Literacy, Portfolio Choice, and Financial Well-Being," *Social Indicators Research,* 132, 799-820. doi:10.1007/s11205-016-1309-z

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

[20] Cole, S., A. Paulson, and G.K. Shastry, (2013), *High School and Financial Outcomes: The Impact of Mandated Personal Finance and Mathematics Courses*, Harvard Business School Working Paper 13-064. Retrieved 9 August 2019 from https://www.hbs.edu/faculty/Pages/item.aspx?num=44063
[21] Conlin, A., P. Kyröläinen, M. Kaakinen, M-R. Järvelin, J. Perttunen, and R. Svento, (2015), "Personality Traits and Stock Market Participation," *Journal of Empirical Finance*, 33, 34–50. https://doi.org/10.1016/j.jempfin.2015.06.001
[22] Corter, J.E., and Y-J. Chen, (2006), "Do Investment Risk Tolerance Attitudes Predict Portfolio Risk?" *Journal of Business and Psychology*, 20, 369-381. https://doi.org/10.1007/s10869-005-9010-5
[23] de Beckker, K., K. de Witte, and G. van Campenhout, (2020), "The Role of National Culture in Financial Literacy: Cross-Country Evidence, *Journal of Consumer Affairs*, advance online publication. https://doi.org/10.1111/joca.12306
[24] de Zwaan, L., C. Lee, Y. Liu, and T. Chadron, (2017), "Overconfidence in Financial Literacy: Implications for Planners," *Financial Planning Research Journal*, 3(2), 31-46.
[25] Dobni, D.M., and M.D. Racine, (2016), "Investors' Images of the Stock Market: Antecedents and Consequences," *Financial Services Review*, 25, 1-28.
[26] Donnelly, G., R. Iyer, and R.T. Howell, (2012), "The Big Five Personality Traits, Material Values, and Financial Well-Being of Self-Described Money Managers," *Journal of Economic Psychology*, 33, 1129–1142. https://doi.org/10.1016/j.joep.2012.08.001
[27] Gervais, S., and T. Odean, (2001), "Learning to be Overconfident," *Review of Financial Studies*, 14(1), 1–27.
[28] Glaser, M., T. Lanzer, and M. Weber, (2005), *Overconfidence of Professionals and Laymen: Individual Differences Within and Between Tasks?* Working Paper, University of Mannheim, Mannheim, Germany. Retrieved 9 August 2019 from https://madoc.bib.uni-mannheim.de/2646/1/dp05_25.pdf
[29] Grable, J.E., and S. Joo, (2001), "A Further Examination of Financial Help-Seeking Behavior," *Financial Counseling and Planning*, 12(1), 55-65.
[30] Grimes, P.W., K.E. Rogers, and R.C. Smith, (2010), "High School Economic Education and Access to Financial Services," *Journal of Consumer Affairs*, 44(2), 317-335. https://doi.org/10.1111/j.1745-6606.2010.01171.x
[31] Guiso, L., and T. Jappelli, (2005), "Awareness and Stock Market Participation," *Review of Finance*, 9, 537-567. https://doi.org/10.1007/s10679-005-5000-8
[32] Haigh, M.S., and J.A List, (2005), "Do Professional Traders Exhibit Myopic Loss Aversion? An Experimental Analysis," *Journal of Finance*, 60(1), 523-534. https://doi.org/10.1111/j.1540-6261.2005.00737.x
[33] Hilgert, M., J. Hogarth, and S. Beverly, (2003), "Household Financial Management: The Connection between Knowledge and Behavior," *Federal Reserve Bulletin*, 89, 309–322.
[34] Hojjatnia, A., (2018, June 2018), "Iranian Mutual Funds; Opportunities to Look For." Retrieved 9 August 2019 from http://agahgroup.com/iranian-mutual-funds-opportunities
[35] Hsiao, Y-J., and W-C. Tsai, (2018), "Financial Literacy and Participation in the Derivatives Markets," *Journal of Banking and Finance*, 88, 15-29. https://doi.org/10.1016/j.jbankfin.2017.11.006

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

[36] Hung, A.A., A.M. Parker, and J.K. Yoong, (2009, September), *Defining and Measuring Financial Literacy*, RAND Labor and Population Working Paper WR-708. Retrieved 9 August 2019 from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1498674
[37] Iswari, T.I. (2020), "How Does the Personality Type Define the Choice? A Survey of Accounting Students," *Review of Integrated Business and Economics Research*, 9(Supplementary 1), 346-360.
[38] Jalilvand, A., M.R. Noroozabad, and J. Switzer, (2018), "Informed and Uninformed Investors in Iran: Evidence from the Tehran Stock Exchange," *Journal of Economics and Business*, 95, 47-58. Retrieved from https://doi.org/10.1016/j.jeconbus.2017.08.004
[39] Jappelli, T., and M. Padula, (2011), *Investment in Financial Literacy and Saving Decisions*, Center for Financial Studies Working Paper No. 2011/07. Retrieved 9 August 2019 from http://nbn-resolving.de/urn:nbn:de:hebis:30-92954
[40] Karlsson, A., and L.L. Nordĕn, (2007), "Home Sweet Home: Home Bias and International Diversification among Individual Investors," *Journal of Banking and Finance*, 31, 317-333. https://doi.org/10.1016/j.jbankfin.2006.04.005
[41] Kim, K.T., S.G. Anderson, and M.C. Seay, (2019), "Financial Knowledge and Short-Term and Long-Term Financial Behaviors of Millennials in the United States," *Journal of Family and Economic Issues*, 40(2), 194-208. https://doi.org/10.1007s10834-018-9595-2
[42] Klapper, L., A. Lusardi, and P. van Oudheusden, (2015), *Financial Literacy around the World*, Washington DC: World Bank. Retrieved 9 August 2019 from http://www.openfininc.org/wp-content/uploads/2016/04/2015-Finlit_paper_17_F3_SINGLES.pdf
[43] Kramer, M.M., (2016), "Financial Literacy, Confidence and Financial Advice Seeking," *Journal of Economic Behavior and Organization*, 131, 198–217. https://doi.org/10.1016/j.jebo.2016.08.016
[44] Letkiewicz, J.C., and J.J. Fox, (2014), "Conscientiousness, Financial Literacy, and Asset Accumulation of Young Adults," *Journal of Consumer Affairs*, 48(2), 274-300. doi:10.1111/joca.12040.
[45] Lo, A.W., D.V. Repin, and B.N. Steenbarger, (2005), "Fear and Greed in Financial Markets: A Clinical Study of Day-Traders," *American Economic Review*, 95(2), 352-359. doi: 10.1257/000282805774670095
[46] Lundeberg, M.A., P.W. Fox, and J. Punc̆ochaŕ, (1994), "Highly Confident but Wrong: Gender Differences and Similarities in Confidence Judgments," *Journal of Educational Psychology*, 86(1), 114-121. http://dx.doi.org/10.1037/0022-0663.86.1.114
[47] Lusardi, A., (2015), "Financial Literacy Skills for the 21st Century: Evidence from PISA," *Journal of Consumer Affairs*, 49(3), 639-659. https://doi.org/10.1111/joca.12099
[48] Lusardi, A., C. de Bassa Scheresberg, and N. Oggero, (2014), *Student Loan Debt in the US: An Analysis of the 2015 NFCS Data*, The Institute for College Access and Success, Student Debt and the Class of 2015. Retrieved 9 August 2019 from http://www.gltfoundation.com/wp-content/uploads/2016/11/GFLEC-Brief-Student-loan-debt.pdf

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

[49] Lusardi, A., P.C. Michaud, and O.S. Mitchell, (2017), "Optimal Financial Knowledge and Wealth Inequality," *Journal of Political Economy*, 125(2), 431-477. https://doi.org/10.1086/690950
[50] Lusardi, A., and O.S. Mitchell, (2007), "Financial Literacy and Retirement Preparedness: Evidence and Implications for Financial Education," *Business Economics*, 42(1), 35–44. https://doi.org/10.2145/20070104
[51] Marsden, M., C.D. Zick, and R.N. Mayer, (2011), "The Value of Seeking Financial Advice," *Journal of Family and Economic Issues*, 32(4), 625-643. doi: 10.1007/s10834-011-9258-z
[52] Mauricas, Z., V. Darškuvienė, and T. Mariničevaitė, (2017), "Stock Market Participation Puzzle in Emerging Economies: The Case of Lithuania," *Organizations and Markets in Emerging Economies*, 8(2), 225-243.
[53] McCrae, R.R., and O.P. John, (1992), "An Introduction to the Five Factor Model and Its Applications," *Personality*, 60(2), 175-215. https://doi.org/10.1111/j.1467-6494.1992.tb00970.x
[54] Mouna, A., and J. Anis, (2017), "Financial Literacy in Tunisia: Its Determinants and Its Implications on Investment Behavior," *Research in International Business and Finance*, 39, 568-577. https://doi.org/10.1016/j.ribaf.2016.09.018
[55] National Council on Economic Education (NCEE), (2005), *What American Teens and Adults Know about Economics*, Washington, D.C. Retrieved 9 August 2019 from https://docplayer.net/131012-What-american-teens-adults-know-about-economics.html
[56] Nosić, A., and M. Weber, (2010), "How Riskily Do I Invest? The Role of Risk Attitudes, Risk Perceptions, and Overconfidence," *Decision Analysis*, 7(3), 282-301. https://doi.org/10.1287/deca.1100.0178
[57] Nyhus, E.K., and P. Webley, (2001), "The Role of Personality in Household Saving and Borrowing Behaviors," *European Journal of Personality*, 15, S85-S103. https://doi.org/10.1002/per.422
[58] Odean, T., (1998), "Volume, Volatility, Price and Profit: When All Trades Are Above Average," *Journal of Finance*, 53, 1887-1934. https://doi.org/10.1111/0022-1082.00078
[59] Oehler, A., and F. Wedlich, (2018), "The Relationship of Extraversion and Neuroticism with Risk Attitude, Risk Perception, and Return Expectations," *Journal of Neuroscience, Psychology, and Economics*, 11(2), 63-92. http://dx.doi.org/10.1037/npe0000088
[60] Oehler, A., S. Wendt, F. Wedlich, and M. Horn, (2018), "Investors' Personality Influences Investment Decisions: Experimental Evidence on Extraversion and Neuroticism," *Journal of Behavioral Finance*, 19(1), 30-48. doi:10.1080/15427560.2017.1366495
[61] Pak, T-Y., and S. Chatterjee, (2016), "Aging, Overconfidence, and Portfolio Choice," *Journal of Behavioral and Experimental Finance*, 12, 112-122. doi:10.1016/j.jbef.2016.10.003.
[62] Palmer, J.C., Y. Chung, Y. Park, and G. Wang, (2018), "Affect and Risky Retirement Investments: The Mediating Influence of Financial Knowledge Networks," *Academy of Management Proceedings*, 2018(1), 11956. https://doi.org/10.5465/AMBPP.2018.11956abstract

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

[63] Pan, C.H., and M. Statman, (2012), "Questionnaires of Risk Tolerance, Regret, Overconfidence, and Other Investor Propensities," *Journal of Investment Consulting*, 13(1), 54-63.
[64] Parker, A.M., W. Bruine de Bruin, J. Yoong, and R. Willis, (2012), "Inappropriate Confidence and Retirement Planning: Four Studies with a National Sample," *Journal of Behavioral Decision Making*, 25, 382-389. doi:10.1002/bdm.745
[65] Paunonen, S.V., and M.C. Ashton, (2001), "Big Five Predictors of Academic Achievement," *Journal of Research in Personality*, 35, 78-90. doi:10.1006/jrpe.2000.2309
[66] Pikulina, E., L. Renneboog, and P.N. Tobler (2017), "Overconfidence and Investment: An Experimental Approach," *Journal of Corporate Finance*, 43, 175-192. https://doi.org/10.1016/j.jcorpfin.2017.01.002
[67] Poterba, J., S. Venti, and D.A. Wise, (2013), "Health, Education, and the Postretirement Evolution of Household Assets," *Journal of Human Capital*, 7(4), 297-339.
[68] Pulford, B.D., and A.M. Colman, (1997), "Overconfidence: Feedback and Item Difficulty Effects," *Personality and Individual Differences*, 23(1), 125-133. https://doi.org/10.1016/S0191-8869(97)00028-7
[69] Robb, C.A., P. Babiarz, and A. Woodyard, (2012), "The Demand for Financial Professionals' Advice: The Role of Financial Knowledge, Satisfaction, and Confidence," *Financial Services Review*, 21(4), 291-305.
[70] Santos, W., B.M. Tabak, J.L.B. Fernandes, A. Matsumoto, and P.C. Chagas, (2010), "The Determinants of Overconfidence: An Experimental Approach, "*Journal of Academy of Business and Economics*, 10(3), 174-179. http://dx.doi.org/10.2139/ssrn.1680962
[71] Sivaramakrishnan, S., M. Srivastava, and A. Rastogi, (2017) "Attitudinal Factors, Financial Literacy, and Stock Market Participation," *International Journal of Bank Marketing*, 35, 818-841. https://doi.org/10.1108/IJBM-01-2016-0012
[72] Tekçe, B., N. Yilmaz, and R. Bildik, (2016), "What Factors Affect Behavioral Biases? Evidence from Turkish Individual Stock Investors," *Research in International Business and Finance*, 37, 515-526. https://doi.org/10.1016/j.ribaf.2015.11.017
[73] Thomas, A., and L. Spataro, (2018), "Financial Literacy, Human Capital and Stock Market Participation in Europe," *Journal of Family and Economic Issues*, 39(4), 532-550. https://doi.org/10.1007/s10834-018-9576-5
[74] Van Rooij, M., A. Lusardi, and R. Alessie, (2007), *Financial Literacy and Stock Market Participation*, University of Michigan Retirement Research Center Working Paper 2007-162. Retrieved 9 August 2019 from https://mrdrc.isr.umich.edu/publications/papers/pdf/wp162.pdf
[75] Van Rooij, M., A. Lusardi, and R. Alessie, (2011), "Financial Literacy and Stock Market Participation," *Journal of Financial Economics*, 101(2), 449–472. https://doi.org/10.1016/j.jfineco.2011.03.006
[76] Veld-Merkoulova, Y.V., (2011), "Investment Horizon and Portfolio Choice of Private Investors," *International Review of Financial Analyses*, 20(2), 68-75. https://doi.org/10.1016/j.irfa.2011.02.005
[77] Weber, E.U., and C.K Hsee, (2000), "Culture and Individual Judgement and Decision Making," *Applied Psychology: An International Review*, 49(1), 32-61. https://doi.org/10.1111/1464-0597.00005

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

[78] Wooldridge, J. M., (2010), *Econometric Analysis of Cross Section and Panel Data* (2nd ed.). Cambridge, MA: MIT Press.
[79] Wu, S-W, J.E.V. Johnson, and M-C. Sung, (2008), "Overconfidence in Judgements: The Evidence, the Implications and the Limitations," *Journal of Prediction Markets*, 2(1), 73–90. doi: 10.1111/j.1470-6431.2010.00982.x
[80] Xia, T., Z. Wang, and K. Li, (2014), "Financial Literacy Overconfidence and Stock Market Participation," *Social Indicators Research*, 119, 1233–1245. doi: 10.1007/s11205-013-0555-9
[81] Xia, J.J., C. Chen, and F. Chen, (2013), "Consumer Financial Capability and Financial Satisfaction," *Social Indicators Research*, 118, 415-432. doi:10.1007/s11205-013-0414-8
[82] Xu, Y., A.H. Beller, B.W. Roberts, and J.R. Brown, (2015), "Personality and Young Adult Financial Distress," *Journal of Economic Psychology*, 51, 90–100. https://doi.org/10.1016/j.joep.2015.08.010
[83] Yates, J.F., J-W. Lee, and J.G.G. Bush, (1997), "General Knowledge Overconfidence: Cross National Variations, Response Style, and 'Reality,'" *Organizational Behavior and Human Decision Processes*, 70(2), 87–94. https://doi.org/10.1006/obhd.1997.2696
[84] Yates, J.F., J-W Lee, H. Shinotsuka, A.L. Patalano, and W.R. Sieck, (1998), "Cross-Cultural Variations in Probability Judgment Accuracy: Beyond General Knowledge Overconfidence?" *Organizational Behavior and Human Decision Processes*, 74(2), 89–117. https://doi.org/10.1006/obhd.1998.2771
[85] Zou, J., and X. Deng, (2019), "Financial Literacy, Housing Value and Household Financial Market Participation: Evidence from Urban China," *China Economic Review*, 55, 52-66. https://doi.org/10.1016/j.chieco.2019.03.008

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)