

Financial Literacy and Investor Literacy of the New Generation of Investors

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Abstract

Traditionally, American stock market investors have been characterized as white, college educated, higher income, and older, with higher financial literacy than the average American (FINRA, 2019). However, over the past few years, as smartphone apps for investing have become more popular and as trade commissions have decreased to zero, millions of Americans, particularly younger Americans, have become first-time investors. This paper looks at the financial literacy of these new investors, using both objective and subjective measures. We find that new investors display high financial literacy, and they score high on measures of investor literacy as well. Finally, we investigate how objective and subjective measures of financial literacy and investor literacy predict trading behavior.

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1. Introduction

Over the past few years, as smartphone apps for investing have become more popular and as trade commissions have decreased to zero, millions of Americans have become first-time stock market investors. In 2020 alone, more than 10 million new brokerage accounts were opened (McCabe, 2020). Little is known about this new generation of investors. Traditionally, American stock market investors have been characterized as white, college educated, higher income, and older, with higher financial literacy than the average American (FINRA, 2019b). One of the few studies that has explored this new generation of investors finds that new investors are younger, more racially diverse, have lower incomes, and hold smaller balances in their brokerage accounts compared to experienced investors (Lush, 2021).

This paper combines data from a new survey with account-level data to provide insight into the new generation of investors, their financial literacy, their investor literacy, and their investing behavior. We explore three measures of financial literacy, one objective measure and two subjective measures. We use responses from the battery of financial literacy questions developed by Lusardi and Mitchell (2009) to create a measure of financial literacy. To distinguish this measure from the subjective measures that we also use, we refer to this measure as *objective financial literacy* as others have previously done (Cupák et al., 2020). For our subjective measures of financial literacy, we elicit subjective probability distributions from respondents over the number of correct responses to measure *confidence in financial literacy*, and we ask respondents to rate their financial knowledge to measure *self-assessed financial literacy*. Likewise, we create three analogous measures of investor literacy using knowledge questions that are more specific to stock market investing. These questions were developed by FINRA for their Investor Survey (FINRA, 2019b).

We find that new investors display high financial literacy. Their financial literacy is notably higher than that found by other studies, including national surveys of broader and more experienced populations. The majority of new investors have well-calibrated confidence in their own financial literacy. Their self-assessed financial literacy is lower than that of other Americans even though their objective financial literacy is higher. We find that new investors also have higher objective investor literacy than has been found in studies of experienced investors. Their confidence in investor literacy is not as well-calibrated as their confidence in financial literacy.

As with financial literacy, we find that self-assessments of their own investor literacy is lower than experienced investors, even though their objective investor literacy is higher.

Previous research on financial literacy has found that both objective and subjective measures are important and independent predictors of financial behaviors. For example, Cupák et al. (2020) use data from the Survey of Consumer Finances and find that objective financial literacy and what we refer to as self-assessed financial literacy both predict investing in equities and bonds. Allgood and Walstad (2016) analyze survey data from FINRA's National Financial Capability Study and find that both objective financial literacy and self-assessed financial literacy predict a variety of financial behaviors, and that self-assessed financial literacy has greater predictive power than objective financial literacy for some behaviors such as seeking financial advice or paying a credit card balance in full. Using a survey of LinkedIn professionals, Anderson et al. (2017) find that even though objective financial literacy predicts precautionary savings and retirement planning, what we refer to as confidence in financial literacy is a better predictor of these behaviors.

As in the previous papers, this paper uses objective and subjective measures of financial literacy to predict financial behaviors, but also uses objective and subjective measures of investor literacy. Furthermore, we use two different subjective measures of literacy. We tie these measures to actual investing behaviors—trading in equities, cryptocurrency, and options, as well as trading frequency.

We find that investor literacy better predicts investing behaviors than financial literacy does. Objective financial literacy predicts trading in exchange traded funds (ETFs) but the subjective measures of financial literacy do not predict ETF trading. Objective financial literacy predicts options trading, but once the subjective measures of financial literacy are added to the specifications, then it loses its predictive power. Confidence and self-assessed financial literacy are predictors of options trading, with self-assessed financial literacy being the stronger predictor. None of the financial literacy measures predict cryptocurrency trading or frequency of trading across all investments.

Investor literacy and financial literacy are positively correlated (each pairwise correlation between measures is positive), but investor literacy predicts a greater range of investing behaviors, with self-assessed investor literacy predicting the widest range of behaviors. All three measures of investor literacy positively predict likelihood of trading ETFs and trading options.

Only the subjective measures of investor literacy predict trading frequency, with self-assessed investor literacy being the better predictor. This finding is consistent with Barber and Odean's (2001) findings that overconfidence, rather than skill, is associated with trading frequency. Finally, only self-assessed investor literacy is associated with increased likelihood of trading crypto.

A review of all these findings suggests that all three types of measures (objective, confidence and self-assessed) play a part in predicting investing behaviors. The objective measures of financial literacy and investor literacy tend to be better predictors of investing behaviors that are consistent with investing for the long-term, such as investing in ETFs. The subjective measures are better predictors of investing behaviors that tend to be riskier, such as trading options. While these findings are valuable to understanding the new generation of investors, it is important to note that the findings in this paper are mostly descriptive, and do not imply causality.

2. Measures of Financial Literacy and Investor Literacy

Financial literacy is defined as the ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial well-being (see Hung et al., 2009). While financial literacy has been shown to be correlated with a wide range of financial behaviors, including stock market participation (see Lusardi and Mitchell, 2014), we are also interested in investors' knowledge about financial concepts specific to the stock market and investing. In addition to measuring knowledge of a broad range of financial concepts, we also measure investor literacy.

2a. Objective Measures of Financial Literacy and Investor Literacy

We measure objective financial literacy by asking respondents a series of financial knowledge questions developed by Lusardi and Mitchell (2009). These questions ask about basic financial concepts like interest, inflation, and the time value of money, as well as concepts related to investing, like diversification, risk, and different types of assets. The full set of 13 financial literacy questions is reported in the Appendix. We calculate a measure of objective financial literacy by summing the number of correct responses out of 13.

We measure objective investor literacy by asking respondents a series of investor knowledge questions used in the FINRA Foundation National Investor Survey (2019a) with one

additional question on options. These questions ask about broad investing concepts that are similar to those in the financial literacy battery of questions, such as diversification and risk. These questions also include more complex topics such as municipal bonds, margin loans, and short selling. The full set of 11 questions is available in the Appendix. Our measure of objective investor literacy is the sum of correct responses out of 11.

2b. Confidence in Financial Literacy and Investor Literacy

We directly elicit respondents' confidence in their responses to the specific set of financial literacy and investor literacy questions. After each set of 3-7 knowledge questions, we elicited respondents' subjective probability distributions over the number of correct responses to the battery of financial (or investment) literacy questions (e.g., "what's the percent chance that you answered all three questions correctly?", "what's the percent chance that you answered two questions correctly?", etc.). This method was proposed by Moore and Healy (2008), and allows us to separately identify two components: expected number of correct responses and certainty about that expectation. A screenshot of the elicitation method is provided in the Appendix.

2c. Self-assessed Financial Literacy and Investor Literacy

We elicit self-assessed financial literacy and investor literacy by asking respondents to rate their own knowledge. In particular, for financial literacy, we ask respondents "How would you assess your overall financial knowledge" on a seven-point scale, following the approach taken in the FINRA Foundation National Financial Capability Study elicitation of self-assessed financial literacy (2019b).

We elicit self-assessed investor literacy in a similar manner. Following FINRA Foundation's Investor Survey (2019a), we ask respondents on a seven-point scale: How would you assess your overall knowledge about investing?

3. Data Overview and Summary Statistics

The data for our analysis come from a series of three linked surveys that were fielded from November 18, 2020 - January 4, 2021. The first survey was sent to 250,000 investors on Robinhood. The survey asked about demographic characteristics, included items from the Consumer Financial Protection Bureau's Financial Well-Being Scale (2017), and measured self-assessed financial literacy and investor literacy as described above. Respondents to the first survey were invited to the second survey, which included additional items on financial well-

being, and measured objective financial and investor literacy, and overconfidence on financial and investor literacy. Objective financial literacy and investor literacy were elicited in a separate survey from self-assessed financial literacy and investor literacy to alleviate concerns about question order effects. The third survey was sent to all respondents to the second survey and asked about household finances and attitudes. The 2,631 survey respondents who completed all three surveys were given a \$20 Amazon gift card.

We also have data on investor behavior, including how long respondents have been investing on the Robinhood platform, the number of trades they have made, and what type(s) of assets they have held—individual stocks, exchange traded funds (ETFs), cryptocurrency (crypto), and/or options.

The sample of 2631 respondents tend to be white, male, college educated, employed full-time and have relatively high income (Table 1). The average age of our respondents is 33.6 years old, 22 percent of respondents are female, 70 percent of respondents are employed full time, and 54 percent of respondents have household income of \$75,000 or more. Two-thirds of respondents are college graduates and 44 percent of respondents are married.

Table 1: Respondent Characteristics

VARIABLES	(1) mean	(2) median
Age (in years)	33.64	31
Female	0.22	0
Employed Full Time	0.70	1
College Degree or more	0.66	1
Married	0.44	0
Income of 75K or more	0.54	1
Investing experience (yrs)	2.17	1.80
Ever purchased individual stock	0.91	1
Ever purchased ETF/ETN	0.36	0
Ever purchased Crypto	0.36	0
Ever traded Options	0.21	0
Average trades per month	7.5	2.1

The average number of years that survey respondents have been investing (on this platform) is 2.2 years. Over 90 percent of respondents have purchased individual stocks, 36 percent have

purchased exchange traded products such as an ETF or exchange traded notes (ETN), 21 percent have traded options, and 36 percent have traded crypto. Investors make 7.5 trades per month, on average (median 2.1).

4. Results

4a. Financial Literacy

As detailed in Section 2, our survey data allow us to construct three different measures of financial literacy. We calculate the number of correct responses to the battery of financial literacy questions to create a measure of *objective financial literacy*. We use the elicited subjective probability distributions over number of correct responses to measure *confidence in financial literacy*. Respondent ratings of their financial knowledge are used as a measure of *self-assessed financial literacy*.

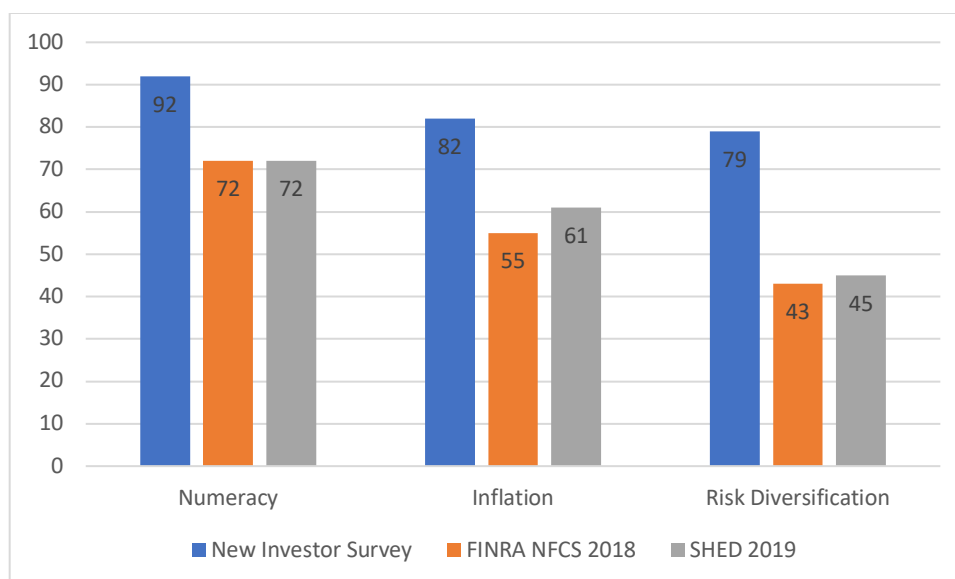
In this section, we describe the data on each measure individually, consider the relationships among the measures, and then explore individual characteristics that predict financial literacy.

4a1. Objective Financial Literacy

New investors' financial literacy is notably higher than that of Americans as a whole. For example, consider the questions that Lusardi and Mitchell (cite) refer to as the "Big three": questions on numeracy, inflation and risk diversification. Figure 1 compares the percentage of correct responses to responses from FINRA Foundation's NFCS and the Federal Reserve's Survey of Household Economics and Decisionmaking (SHED).²

Figure 1: Percent Correct Responses to the "Big Three" Financial Literacy Questions

² See FINRA (2019a) and <https://www.federalreserve.gov/publications/2020-economic-well-being-of-us-households-in-2019-retirement.htm>



A larger percentage of respondents to the new investor survey answers each of the three questions correctly, compared to Americans from the NFCS or the SHED. We find that 67 percent of new investors answer all three questions correctly, which is a larger proportion than almost any study has found worldwide (see Table 2 in Lusardi and Mitchell, 2014). On average, respondents from the new investor survey answer 2.5, or 84 percent, questions correctly. The SHED finds that Americans who rate themselves as “mostly or very comfortable with investing” get 75 percent correct on average.

Table 2 shows the percent correct by financial literacy question. Respondents are most likely to respond correctly on questions about numeracy (Q1), asset volatility (Q11), and mortgage interest (Q4). Respondents are least likely to answer correctly the questions about the relationship between interest rates and bond prices (Q13), knowledge about mutual funds (Q8), and which asset has the highest return over a long period (Q10). Questions about interest rates and bond prices (Q13), knowledge about mutual funds (Q8), and whether stocks or mutual funds are less risky (Q3) resulted in the greatest proportions of “Don’t know” responses.

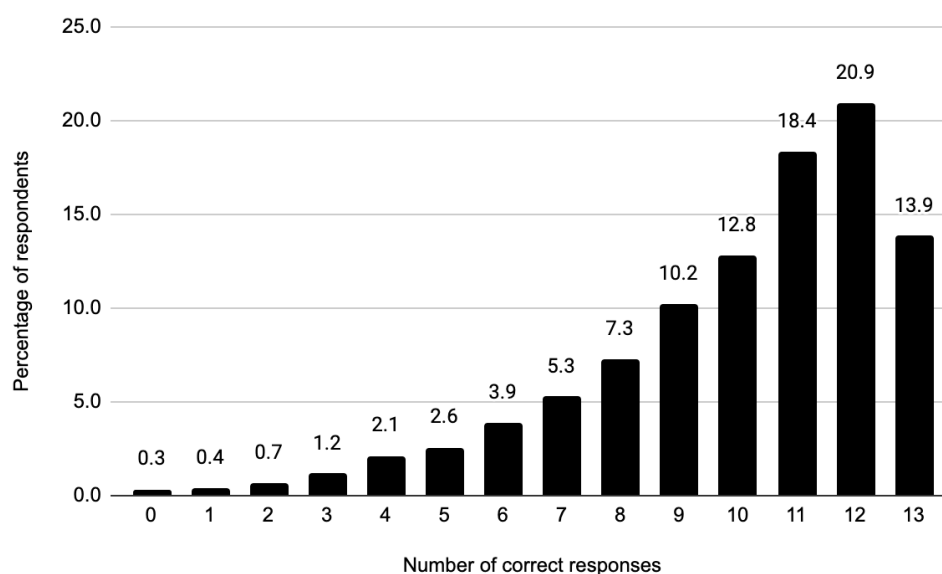
Table 2: Percent Correct by Financial Literacy Question

Question	% Correct	% Incorrect	% DK
1. Numeracy	92.4	5.3	2.4
2. Inflation	82.5	12.3	5.2
3. Risk Diversification (stock vs stock mutual funds)	78.4	5.4	16.2
4. Mortgage Interest	89.4	5.7	4.9

5. Time Value of Money (inheritance)	71.4	21.5	7.1
6. Inflation (prices double)	79.5	18.1	2.4
7. Main function of the stock market	71.0	23.4	5.6
8. Knowledge of mutual fund.	68.6	10.6	20.7
9. Which is riskier: stocks vs bonds	85.1	7.9	7.0
10. Highest return over long period: savings accounts, bonds or stocks	69.1	22.7	8.3
11. Highest fluctuations: savings accounts, bonds, stocks	91.0	4.9	4.1
12. Risk Diversification	85.6	10.4	4.0
13. Relation between interest rate and bond prices	35.0	40.4	24.7

Figure 2 below shows the distribution of correct responses. The average number of correct responses is about 10 out of 13, and the modal number correct is 12.

Figure 2: Distribution of Actual Correct Responses to 13 Financial Literacy Questions

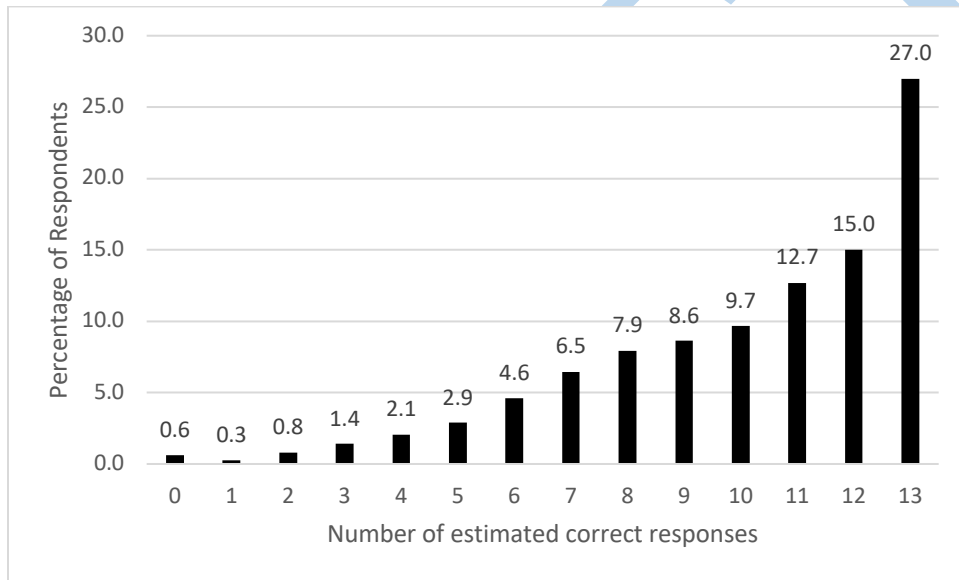


4a2. Confidence in Financial Literacy

At three points in the battery of financial literacy questions—after the Big Three questions, after Questions 4-6, and after the final seven financial literacy questions—we elicited respondents' subjective probability distributions over the number of correct answers they thought they answered correctly in the preceding section of three to seven questions. We use these data to calculate each respondent's point estimate of the number of questions to which he/she/they responded correctly. For example, consider a section with three questions, such as the Big Three.

We calculate $\sum_{j=0}^3 I_j p_j$, where I_j is an indicator for having $j \in [0, 3]$ correct answers in that set, and p_j is the subjective probability the respondent gives to having that many correct. Summing over each set of questions gives us the respondent's subjective expectation of the number of correct responses out of the 13 total questions, which we use as a measure of the respondent's confidence in his/her/their financial literacy. Figure 3 below shows the distribution of expected correct responses, rounded to the nearest whole number. The average number of expected correct responses is 10.1.

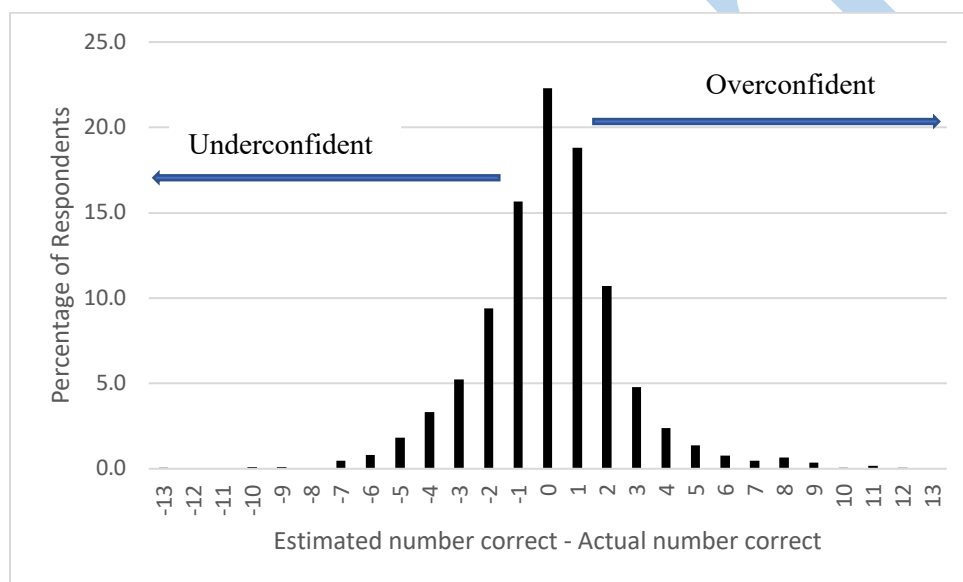
Figure 3: Distribution of Estimated Correct Responses to 13 Financial Literacy Questions



Using these subjective probability distribution data, we can also compute a measure of respondents' overestimation, which is one type of overconfidence. Overestimation is the degree to which respondents believe that they answered more answers correctly than they actually answered correctly. In Figure 4, we show the distribution of the difference between estimated correct responses and actual responses (rounded to the nearest whole number). Respondents for whom the difference between estimated and actual number of correct responses is positive display evidence of overconfidence. Respondents for whom this difference is negative display evidence of underconfidence. About 45.2 percent of respondents display overconfidence and 44.2 percent of respondents display underconfidence; the difference between these percentages is not different from 0 at any reasonable level of statistical significance. The remaining 10.6 percent are perfectly calibrated in that the difference between their estimated and actual number

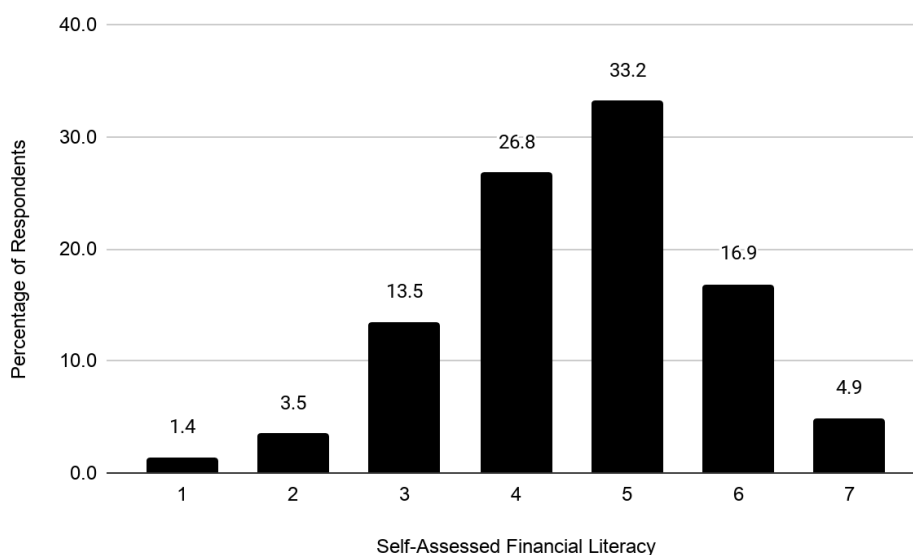
correct is exactly zero. If we relax the restriction and consider respondents whose difference is less than 1.5 in absolute value, we find that 57.5 percent of respondents have well-calibrated confidence in their own financial literacy. Thus these results provide no systematic evidence of measured overconfidence in this population of investors. There is an open question, to be addressed in the next section, as to whether the extent of measured overconfidence or underconfidence is predictive of investment behavior.

Figure 4: Over- and under-confidence in financial literacy



4a3. Self-assessed Financial Literacy

Even though survey respondents display high *objective* financial literacy and do not display excessive underconfidence in their financial literacy, their self-assessed financial knowledge is relatively low, as seen in Figure 5. On a seven-point scale, the average self-assessed rating is 4.6 and the median is 5. Even though new investor survey respondents have higher objective financial literacy than the average American, their self-assessments are lower than those of Americans as a whole: 55 percent of new investor survey respondents rate their financial knowledge as a five or above. By comparison, the NFCS reports that 71 percent of Americans rate their knowledge as a five or above.

Figure 5: Distribution of Self-Assessed Financial Literacy Ratings

4a4. Relationships between Objective Financial Literacy, Confidence in Financial Literacy, and Self-assessed Financial Literacy

We begin by comparing the pairwise correlations between the three measures of financial literacy—objective, confidence, and self-assessed. As seen in Table 3, all pairwise correlations are positive. Objective financial literacy and confidence in financial literacy have the highest correlation at about 0.6. Objective and self-assessed financial literacy are the least correlated, with a coefficient of 0.3.

Table 3: Correlations between Measures of Financial Literacy

	Objective	Confidence	Self-Assessed
Objective	1		
Confidence	0.599	1	
Self-Assessed	0.306	0.376	1

Table 4 shows the average confidence in financial literacy and self-assessed financial literacy by number of correct responses. For example, for the 365 respondents who got all 13 questions correct, their average estimated number correct is 12.08 and their average rating of their own financial knowledge on a seven-point scale is 5.21. Those who know less about financial literacy know that they know less: respondents who have fewer number of correct

responses tend to have less confidence and give themselves lower ratings for their financial knowledge.

Table 4: Average Confidence and Self-Assessed Financial Literacy by Correct Responses

	Number correct (out of 13)	Confidence in FL (Subjective expectation of number correct out of 13)	Self-Assessed FL (out of 7)	N
All	10.00	10.06	4.57	2,631
13 correct	13	12.08	5.21	365
12 correct	12	11.56	4.93	551
11 correct	11	10.91	4.64	482
10 correct	10	9.94	4.40	337
9 correct	9	9.03	4.19	269
8 correct	8	8.21	4.29	192
7 correct	7	7.66	4.06	139
6 correct	6	7.00	3.96	103
5 correct	5	6.78	4.04	68
4 or fewer correct	2.9	6.54	3.94	125

Those
who got:

4a5. Predictors of Financial Literacy

Table 5 reports estimated best linear predictors (BLPs) of the financial literacy measures, where “best” is defined in terms of squared prediction errors. Financial literacy, confidence in financial literacy, and self-assessed financial literacy are all lower for women, those with lower income, and those with less education. Financial literacy, both objective and subjective, increases in years of investing. Women’s objective financial literacy scores are, on average, 1.1 lower than that of men (out of 13). Their confidence is even lower: the average of the expected number of correct is 1.6 lower for women than for men. Those with a college degree answer one additional question correctly, compared to those without a college degree, but the average expected number correct is only 0.6 higher than those without a college degree.

Notably, we do not find a positive relationship between age and objective financial literacy, as has been commonly found in other studies (Lusardi and Mitchell, 2014). However, confidence in financial literacy and self-assessed financial literacy increase with age in our sample.

Table 5: Least Squares Predictors of Objective and Subjective Financial Literacy

VARIABLES	(1) Objective FL	(2) Confidence in FL	(3) Self-assessed FL
Female	-1.103*** (0.116)	-1.628*** (0.129)	-0.434*** (0.0567)
Age	0.00482 (0.00392)	0.0123*** (0.00436)	0.00428** (0.00191)
College degree or more	1.046*** (0.106)	0.577*** (0.118)	0.199*** (0.0517)
Over 75K income	0.807*** (0.105)	0.722*** (0.116)	0.286*** (0.0509)
Investing experience	0.240*** (0.0330)	0.240*** (0.0367)	0.125*** (0.0161)
Constant	8.426*** (0.161)	8.714*** (0.179)	3.963*** (0.0784)
Observations	2,627	2,627	2,627
R-squared	0.158	0.132	0.095

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4b. Investor Literacy

Turning now to investor literacy, we construct three different measures of investor literacy, as we did with financial literacy. *Objective investor literacy* is measured as the number of correct responses to the battery of investor literacy questions. We use the elicited subjective probability distributions over number of correct responses to measure *confidence in investor literacy*, based on the subjective expectation of the number correct. Respondents' ratings on a seven-point scale of their financial knowledge are used as a measure of *self-assessed investor literacy*.

In this section, we present descriptive analysis of each measure of investor literacy individually, explore the relationships among the measures, and then consider individual characteristics that predict investor literacy.

4b1. Objective Investor Literacy

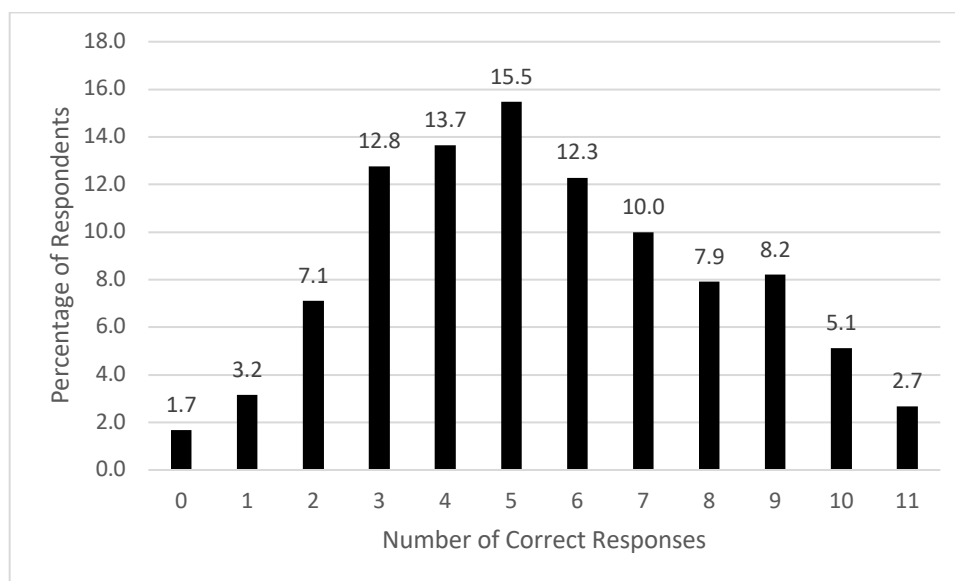
Table 6 shows the percent correct by investor literacy question. We include results from FINRA’s National Investor Survey (2019) as a point of comparison. Respondents to the New Investor survey are most likely to respond correctly on questions about the definition of a stock (Q1) and the risk-return tradeoff (Q3). Respondents are least likely to answer correctly the questions about municipal bonds (Q8) and options (Q11). These are also the questions that yielded the most “Don’t Know” responses.

Table 6: Percent Correct by Investor Literacy Question

Question	New Investor Survey			FINRA National Investor Survey		
	% Correct	% Incorrect	% DK	% Correct	% Incorrect	% DK
1. Stock Definition	89.2	7.8	3.0	72	23	5
2. Bond Definition	52.6	32.8	14.6	63	18	19
3. Risk Return Tradeoff	77.4	14.1	8.5	74	15	11
4. Highest historical returns	63.9	16.0	20.1	56	21	23
5. Bankruptcy	60.0	19.3	20.7	51	27	22
6. Past Performance	43.7	8.6	2.4	44	46	10
7. Index funds	41.0	27.7	31.3	30	31	39
8. Municipal bonds	24.1	35.2	40.7	34	39	27
9. Buying on margin	34.8	44.7	20.5	23	54	23
10. Short selling	38.3	45.3	16.4	22	57	21
11. call options	23.9	36.7	39.4			

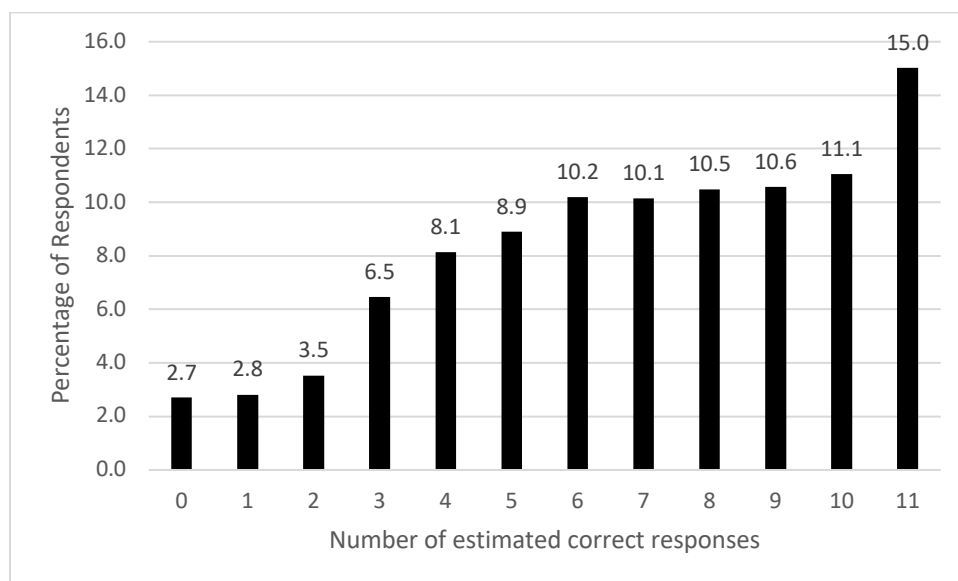
Figure 6 below shows the distribution of correct responses. The average number of correct responses is 5.5 out of 11, and the modal number correct is 5. Restricting attention to the ten questions that were also asked on the FINRA Investor survey, respondents to the New Investor survey had an average of 5.3 correct responses and respondents to FINRA’s Investor survey had an average of 4.7 correct responses.

It’s not surprising that investor literacy is lower than financial literacy given that investor literacy asks about concepts that are more complex and specialized. Respondents answered almost 77 percent of questions correctly (10 out of 13) on the financial literacy battery, whereas the answered about half of questions correctly on the investor literacy set of questions.

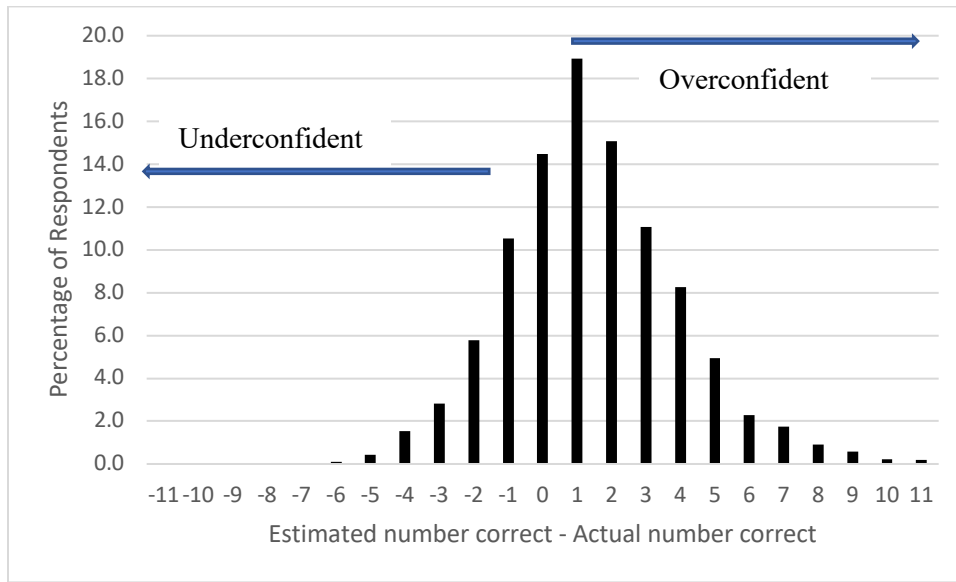
Figure 6: Distribution of Actual Correct Responses to 11 Investor Literacy Questions

4b2. Confidence in Investor Literacy

We elicited respondents' subjective probability distributions over the number of correct answers they gave to the preceding set of questions at two points; once after the first four investor literacy questions, and again after the last seven investor literacy questions. As with confidence in financial literacy, we use these data to calculate each respondent's subjective expectation of the number of questions to which he/she/they responded correctly. We use the respondent's expected total number of estimated correct responses out of the 11 total investor literacy questions as a measure of the respondent's confidence in his/her/their investor literacy. Figure 7 below shows the distribution of estimated correct responses, rounded to the nearest whole number. The average number of expectation correct responses is 6.9 out of 11 questions; in other words, the average subjective expectation is that approximately 63 percent of questions were answered correctly. In contrast, for financial literacy, the average expectation is that approximately 77 percent of questions were answered correctly.

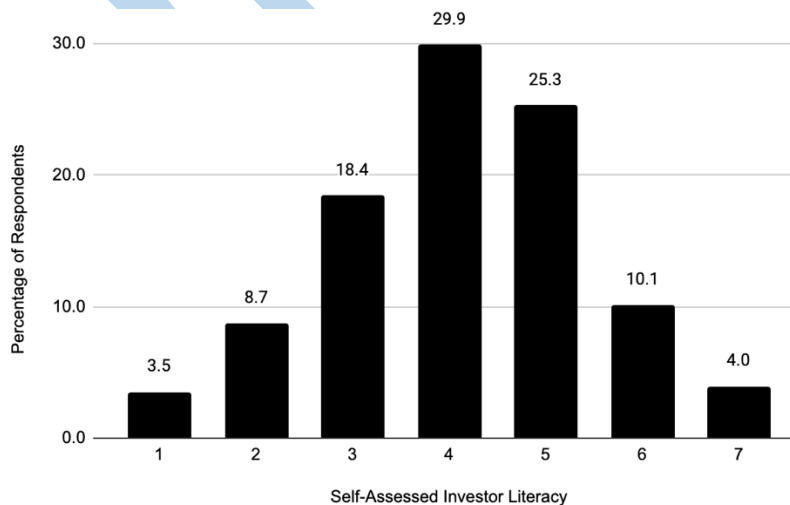
Figure 7: Distribution of Estimated Correct Responses to 11 Investor Literacy Questions

Using these subjective probability distribution data, we can also compute respondents' overestimation of their investor literacy. In Figure 8, we show the distribution of the difference between expected correct responses to the investor literacy questions and actual correct responses (rounded to the nearest whole number). Respondents display more overconfidence in their investor literacy than they did in their financial literacy. Almost 68 percent of respondents display overconfidence in their investor literacy in the sense that their expected number correct exceeds the actual number correct. In contrast, 25 percent of respondents display underconfidence. We find that respondents' confidence in investor literacy is less well calibrated than their confidence in financial literacy: about 7.3 percent are perfectly calibrated--the difference between their estimated and actual number correct is exactly zero. Relaxing the restriction and considering respondents whose difference is less than 1.5 in absolute value, we find that 44.7 percent of respondents have well-calibrated confidence in their own investor literacy.

Figure 8: Over- and under-confidence in investor literacy

4b3. Self-assessed Investor Literacy

On a seven-point scale, the average self-assessed investor rating is 4.1 and the median is 4. As with financial literacy, we find that even though New Investor survey respondents score slightly better on investor literacy than American investors in general, they tend to assess their own investment knowledge lower. About forty percent of survey respondents rate their financial knowledge as a five or above. By comparison, the FINRA Investor Survey finds that 64 percent of investors rate their knowledge as a five or above.

Figure 9: Distribution of Self-Assessed Investor Literacy Ratings

4b4. Relationships between Objective Investor Literacy, Confidence in Investor Literacy, and Self-assessed Investor Literacy

As with financial literacy, pairwise correlations between objective, confidence, and self-assessed investor literacy are positive (Table 7). Objective investor literacy and confidence in investor literacy have the highest correlation at 0.6. The other two pairwise correlations are about 0.5.

Table 7: Correlations between Measures of Investor Literacy

	Objective	Confidence	Self-Assessed
Objective	1		
Confidence	0.609	1	
Self-Assessed	0.452	0.465	1

Table 8 shows the average confidence in investor literacy and self-assessed investor literacy by number of correct responses to the battery of investor literacy questions. Those who have greater number of correct responses tend to have more confidence and give themselves higher ratings for their investor knowledge. In other words, those who know more tend to know that they know more.

Table 8: Average Confidence and Self-Assessed Investor Literacy by Correct Responses

	Number correct (out of 11)	Confidence in IL (Subjective expectation of number correct out of 11)	Self-Assessed IL (out of 7)	N
All	5.49	6.89	4.11	2,631
11 correct	11	10.36	5.66	70
10 correct	10	9.97	5.27	135
9 correct	9	9.41	4.87	216
8 correct	8	8.83	4.68	208
7 correct	7	8.20	4.49	263
Those who got:	6 correct	7.22	4.07	323
	5 correct	6.41	4.02	407
	4 correct	6.12	3.78	359
	3 correct	4.95	3.57	336
	2 correct	4.43	3.30	187

0 or 1 correct	0.65	3.24	2.94	127
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4b5. Predictors of Investor Literacy

Table 9 reports estimated BLPs of the investor literacy measures. Investor literacy, confidence in investor literacy, and self-assessed investor literacy are lower for women, those with lower income, and those with lower educational attainment. As with financial literacy, we see that objective investor literacy is lower for women than for men, but the gender disparity is ever greater for confidence in investor literacy than objective investor literacy. We again find college graduates have higher objective investor literacy than those who do not have a college degree, but this difference decreases when looking at confidence in investor literacy.

Table 9: Least Squares Predictors of Objective and Self-assessed Investor Literacy

VARIABLES	(1) Objective IL	(2) Confidence in IL	(3) Self-assessed IL
Female	-1.484*** (0.114)	-1.830*** (0.138)	-0.669*** (0.0612)
Age	0.00572 (0.00385)	0.0118** (0.00466)	0.00325 (0.00207)
College degree or more	0.874*** (0.104)	0.560*** (0.126)	0.256*** (0.0558)
Over 75K income	0.533*** (0.103)	0.501*** (0.124)	0.289*** (0.0550)
Investing Experience	0.317*** (0.0324)	0.255*** (0.0392)	0.171*** (0.0174)
Constant	4.071*** (0.158)	5.704*** (0.191)	3.451*** (0.0848)
Observations	2,627	2,627	2,627
R-squared	0.174	0.121	0.135

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4c. Relationships between Financial Literacy and Investor Literacy

Given the overlap in concepts, investor literacy might be thought of as a specialized subset of financial literacy. Table 10 provides the correlation matrix between the different measures of financial literacy and investor literacy.

Table 10: Correlations between Financial Literacy and Investor Literacy

		Financial Literacy			Investor Literacy		
		Objective	Confidence	Self-Assessed	Objective	Confidence	Self-Assessed
Financial Literacy	Objective	1					
	Confidence	0.599	1				
	Self-Assessed	0.306	0.376	1			
Investor Literacy	Objective	0.625	0.511	0.391	1		
	Confidence	0.477	0.785	0.390	0.609	1	
	Self-Assessed	0.353	0.410	0.758	0.452	0.465	1

The objective measures of financial literacy and investor literacy are correlated. Pairwise correlations between confidence in financial literacy and investor literacy and between self-assessed financial and investor literacy are even higher. This suggests that subjective measures of financial and investor literacy reflect not just knowledge, but also individual trait(s) that affect confidence and self-assessments across financial literacy and investor literacy domains.

4d. Investing Behaviors, Financial Literacy, and Investor Literacy

In this section, we consider how the different measures of financial literacy and investor literacy predict investment behaviors. In particular we consider trading ETFs, trading individual stocks, trading cryptocurrency, and trading options. We also consider frequency of trading any type of asset.

Table 11 reports results from estimating BLPs of ETF trading. These results may be interpreted as linear probability models of whether the investor trades ETFs in their accounts. Column (1) shows that objective financial literacy is associated with increased likelihood of trading ETFs, even controlling for demographics and years of trading experience. In all

specifications in Table 10, those with a college degree and those with more trading experience are more likely to trade ETFs. Women are less likely to trade ETFs, and likelihood of trading ETFs decreases with age. We add our measure of confidence in financial literacy to the specification in Column (2) and find that the predicted likelihood of trading ETFs varies little with confidence in financial literacy, and this variation is not significantly different from 0. Likewise, in Column 3, when we add self-assessed financial literacy to the model, we find that it does not provide significant predictive power.

In Columns (4) through (6), we replace financial literacy with investor literacy in the specifications. We see that objective investor literacy is associated with increased likelihood of trading ETFs. Confidence in investor literacy is not a significant additional predictor of ETF trading, when we add it to the specification shown in Column (5). However, we find that both self-assessed investor literacy and objective investor literacy positively predict significant variation in the likelihood of trading ETFs when included in the model simultaneously (Column (6)).

Table 11: Least Squares Predictors of ETF Trading

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Objective FL	0.0252*** (0.00367)	0.0239*** (0.00432)	0.0235*** (0.00432)			
Confidence in FL		0.00216 (0.00385)	0.000843 (0.00398)			
Self-Assessed FL			0.0115 (0.00766)			
Objective IL				0.0265*** (0.00383)	0.0282*** (0.00453)	0.0255*** (0.00461)
Confidence in IL					-0.00250 (0.00365)	-0.00558 (0.00376)
Self-Assessed IL						0.0250*** (0.00766)
Over 75K income	0.00218 (0.0205)	0.00167 (0.0206)	-0.000325 (0.0206)	0.00842 (0.0203)	0.00879 (0.0203)	0.00456 (0.0203)
College deg or more	0.0418** (0.0204)	0.0419** (0.0204)	0.0408** (0.0204)	0.0450** (0.0202)	0.0450** (0.0202)	0.0427** (0.0202)
Age	-0.00292*** (0.000944)	-0.00294*** (0.000951)	-0.00297*** (0.000946)	-0.00295*** (0.000955)	-0.00293*** (0.000948)	-0.00296*** (0.000930)

Female	-0.0677*** (0.0215)	-0.0656*** (0.0219)	-0.0632*** (0.0219)	-0.0562** (0.0218)	-0.0583*** (0.0221)	-0.0512** (0.0221)
Investing Exp	0.0520*** (0.00656)	0.0518*** (0.00657)	0.0508*** (0.00662)	0.0497*** (0.00660)	0.0498*** (0.00660)	0.0472*** (0.00665)
Constant	0.0776* (0.0450)	0.0698 (0.0470)	0.0392 (0.0512)	0.182*** (0.0384)	0.190*** (0.0392)	0.132*** (0.0421)
Observations	2,627	2,627	2,627	2,627	2,627	2,627
R-squared	0.079	0.079	0.080	0.080	0.080	0.084

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 12 reports results from linear probability models of individual stock trading. We include these results for completeness, even though interpretation is difficult given that over 92 percent of our sample trade individual stocks. The small sample of 229 respondents who have never traded individual stocks are a heterogeneous group in terms of investing behavior: 77 percent have not yet placed a trade, 8 percent have traded ETFs, 9 percent have traded options, and 10 percent have traded crypto (these latter three categories are not mutually exclusive).

Table 12: : Least Squares Predictors of Individual Stock Trading

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Objective FL	-0.00267 (0.00242)	-0.00236 (0.00273)	-0.00237 (0.00272)			
Confidence in FL		-0.000504 (0.00246)	-0.000522 (0.00251)			
Self-Assessed FL			0.000151 (0.00534)			
Objective IL				-0.00972*** (0.00262)	-0.0110*** (0.00300)	-0.0119*** (0.00300)
Confidence in IL					0.00187 (0.00220)	0.000831 (0.00223)
Self-Assessed IL						0.00843* (0.00502)
Over 75K income	0.0140 (0.0124)	0.0141 (0.0124)	0.0140 (0.0124)	0.0170 (0.0122)	0.0167 (0.0122)	0.0153 (0.0122)
College deg or more	-0.00967 (0.0119)	-0.00970 (0.0119)	-0.00971 (0.0120)	-0.00397 (0.0117)	-0.00393 (0.0117)	-0.00471 (0.0116)
Age	-0.00124* (0.000695)	-0.00124* (0.000696)	-0.00124* (0.000695)	-0.00120* (0.000683)	-0.00121* (0.000691)	-0.00122* (0.000685)

Female	-0.0304** (0.0153)	-0.0309** (0.0152)	-0.0309** (0.0152)	-0.0419*** (0.0152)	-0.0403*** (0.0151)	-0.0379** (0.0150)
Investing Exp	0.00476 (0.00389)	0.00481 (0.00391)	0.00480 (0.00397)	0.00720* (0.00396)	0.00712* (0.00397)	0.00624 (0.00403)
Constant	0.977*** (0.0319)	0.978*** (0.0333)	0.978*** (0.0380)	0.994*** (0.0268)	0.988*** (0.0275)	0.969*** (0.0313)
Observations	2,627	2,627	2,627	2,627	2,627	2,627
R-squared	0.007	0.007	0.007	0.013	0.013	0.014

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Results from linear probability models of crypto trading are presented in Table 13. In all specifications, those with a college degree and women are less likely to trade crypto.

Furthermore, the likelihood of trading crypto decreases with age. Columns (1) – (3) show that after controlling for demographic characteristics, none of the measures of financial literacy predict trading crypto. In Columns (4)-(6) we find that neither objective investor literacy nor confidence in investor literacy predict crypto trading. In Column (6) we see that greater self-assessed investor literacy, however, is associated with increased likelihood of trading crypto.

Table 13: : Least Squares Predictors of Cryptocurrency Trading

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Objective FL	0.00566 (0.00389)	0.00662 (0.00458)	0.00646 (0.00459)			
Confidence in FL		-0.00160 (0.00404)	-0.00213 (0.00415)			
Self-Assessed FL			0.00462 (0.00826)			
Objective IL				0.00466 (0.00397)	0.00375 (0.00470)	0.00152 (0.00478)
Confidence in IL					0.00137 (0.00382)	-0.00116 (0.00393)
Self-Assessed IL						0.0205*** (0.00795)
Over 75K income	-0.0204 (0.0210)	-0.0200 (0.0211)	-0.0208 (0.0211)	-0.0183 (0.0209)	-0.0185 (0.0209)	-0.0220 (0.0209)
College deg or more	-0.112*** (0.0215)	-0.112*** (0.0215)	-0.112*** (0.0215)	-0.110*** (0.0214)	-0.110*** (0.0214)	-0.112*** (0.0213)

Age	-0.00232*** (0.000861)	-0.00230*** (0.000859)	-0.00231*** (0.000857)	-0.00232*** (0.000861)	-0.00233*** (0.000866)	-0.00235*** (0.000850)
Female	-0.136*** (0.0219)	-0.138*** (0.0225)	-0.137*** (0.0226)	-0.136*** (0.0224)	-0.134*** (0.0227)	-0.129*** (0.0229)
Investing Exp	0.00630 (0.00642)	0.00646 (0.00643)	0.00604 (0.00648)	0.00618 (0.00647)	0.00612 (0.00647)	0.00397 (0.00651)
Constant	0.477*** (0.0473)	0.483*** (0.0496)	0.471*** (0.0542)	0.506*** (0.0379)	0.502*** (0.0396)	0.454*** (0.0435)
Observations	2,627	2,627	2,627	2,627	2,627	2,627
R-squared	0.035	0.035	0.035	0.034	0.034	0.037

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In Table 14, we repeat the same analyses for options trading. Across all specifications, likelihood of trading options is increasing in years of investment experience and decreasing in age. Women are significantly less likely to trade options. In Column (1), we see that objective financial literacy positively predicts options trading. However, once confidence in financial literacy is included in the specification (Column (2)), we find that the predicted variations with objective financial literacy is greatly reduced—it no longer significantly predicts options trading. Confidence in financial literacy positively and significantly predicts options trading. The specification in Column (3) adds self-assessed financial literacy and finds that it and confidence in financial literacy are both predictive of options trading.

The specifications in Columns (4) through (6) replace financial literacy with investor literacy. Objective investor literacy is associated with increased likelihood of trading options. In the specification shown in Column (5) where confidence in investor literacy is added, we see that both measures of investor literacy predict options trading. Finally, in Column (6) we see that each of the three measures of investor literacy—objective, confidence, and self-assessed—predicts options trading when included in the model simultaneously.

Table 14: Least Squares Predictors of Options Trading

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Objective FL	0.0128*** (0.00317)	0.00391 (0.00380)	0.00294 (0.00380)			
Confidence in FL		0.0149***	0.0118***			

		(0.00334)	(0.00350)			
Self-Assessed FL			0.0269***			
			(0.00689)			
Objective IL			0.0408***	0.0313***	0.0287***	
			(0.00337)	(0.00400)	(0.00407)	
Confidence in IL				0.0143***	0.0113***	
				(0.00309)	(0.00317)	
Self-Assessed IL					0.0244***	
					(0.00653)	
Over 75K income	-0.000770	-0.00430	-0.00898	-0.0122	-0.0143	-0.0184
	(0.0190)	(0.0190)	(0.0174)	(0.0184)	(0.0185)	(0.0185)
College deg or more	0.00123	0.00199	-0.000580	-0.0210	-0.0207	-0.0229
	(0.0178)	(0.0177)	(0.0177)	(0.0170)	(0.0170)	(0.0170)
Age	-0.00387***	-0.00401***	-0.00408***	-0.00404***	-0.00415***	-0.00418***
	(0.00134)	(0.00138)	(0.000643)	(0.00139)	(0.00145)	(0.00143)
Female	-0.128***	-0.113***	-0.108***	-0.0814***	-0.0693***	-0.0624***
	(0.0154)	(0.0157)	(0.0197)	(0.0155)	(0.0157)	(0.0157)
Investing Exp	0.0331***	0.0317***	0.0293***	0.0233***	0.0226***	0.0201***
	(0.00578)	(0.00578)	(0.00549)	(0.00568)	(0.00565)	(0.00567)
Constant	0.172***	0.118**	0.0458	0.114**	0.0710	0.0147
	(0.0512)	(0.0524)	(0.0437)	(0.0476)	(0.0486)	(0.0506)
Observations	2,627	2,627	2,627	2,627	2,627	2,627
R-squared	0.068	0.075	0.080	0.118	0.125	0.130

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In Table 15, we report BLPs of trading frequency. Because trades per month is highly skewed, here we define “best” in terms of absolute prediction errors, rather than squared prediction errors. These least absolute deviation (LAD) predictions may be interpreted as median regression models of trading frequency. In all specifications, women trade less frequently and trading frequency decreases with years of investment experience. Columns (1) – (3) show that after controlling for demographic characteristics, none of the measures of financial literacy predict trading frequency. In Columns (4)-(6) we find that that objective investor literacy does not predict trading frequency. In Column (5) adds confidence in investor literacy to the specification, and we find that it predicts trading frequency. However, once self-assessed investor literacy is added to the specification (Column (6)), we find that the effect of confidence in investor literacy is greatly reduced, but self-assessed investor literacy predicts trading frequency.

Table 15: Least Absolute Deviation Predictors of Trades per Month

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Objective FL	0.0320 (0.0308)	0.0240 (0.0342)	0.00856 (0.0329)			
Confidence in FL		0.0382 (0.0282)	0.0345 (0.0296)			
Self-Assessed FL			0.0883 (0.0710)			
Objective IL				0.0482 (0.0362)	0.00233 (0.0399)	-0.0312 (0.0408)
Confidence in IL					0.0861*** (0.0298)	0.0569* (0.0318)
Self-Assessed IL						0.232*** (0.0607)
Over 75K income	0.259* (0.144)	0.196 (0.150)	0.157 (0.169)	0.245 (0.157)	0.209 (0.150)	0.174 (0.159)
College deg or more	0.0442 (0.177)	0.0599 (0.176)	0.0262 (0.171)	0.0104 (0.177)	0.000376 (0.189)	-0.0308 (0.183)
age	-0.0111 (0.00802)	-0.0138** (0.00697)	-0.0108 (0.00830)	-0.0122* (0.00730)	-0.0115 (0.00858)	-0.0118 (0.00732)
female	-1.321*** (0.164)	-1.189*** (0.157)	-1.204*** (0.164)	-1.269*** (0.146)	-1.159*** (0.153)	-1.075*** (0.152)
Investment Exp	-0.446*** (0.0472)	-0.462*** (0.0479)	-0.459*** (0.0503)	-0.459*** (0.0518)	-0.454*** (0.0473)	-0.459*** (0.0445)
Constant	3.417*** (0.443)	3.241*** (0.426)	2.985*** (0.482)	3.579*** (0.351)	3.216*** (0.423)	2.706*** (0.378)
Observations	2,627	2,627	2,627	2,627	2,627	2,627

5. Discussion

This paper is the first to provide valuable insights into the new generation of investors. Using survey data linked to account-level data, we find that this new generation of investors have high financial literacy, especially compared to broader populations of Americans. We do not find systematic evidence that new investors are overconfident in their financial literacy. Moreover, their self-assessed financial literacy is lower than that of other Americans even though their objective financial literacy is higher. We find that new investors have higher investor literacy

than surveys of experienced investors have found. As with financial literacy, we find that self-assessments of own investor literacy are lower than those of experienced investors, even though their objective investor literacy is higher.

We use these measures of financial and investor literacy to predict investing behaviors—trading in equities, cryptocurrency, and options, as well as trading frequency. Objective financial literacy predicts trading in exchange traded funds (ETFs) but the subjective measures of financial literacy do not predict ETF trading. Objective financial literacy predicts options trading, but once the subjective measures of financial literacy are added to the specifications, then objective financial literacy loses its predictive power. Confidence and self-assessed financial literacy are predictors of options trading, with self-assessed financial literacy being the stronger predictor. None of the financial literacy measures predict cryptocurrency trading or frequency of trading across all investments.

All three measures of investor literacy predict these investing behaviors, with self-assessed investor literacy predicting the widest range of behaviors. All three measures of investor literacy positively predict likelihood of trading ETFs and trading options when included in the models simultaneously, in addition to some demographic characteristics. Only the subjective measures of investor literacy predict trading frequency, with self-assessed investor literacy being the better predictor. Finally, only self-assessed investor literacy is associated with increased likelihood of trading crypto.

We generally find that investor literacy better predicts investing behaviors than financial literacy does. All three types of measures (objective, confidence and self-assessed) play a part in predicting investing behaviors, which suggests that the objective measures and subjective measures are measuring separate underlying constructs that are both important to predicting trading behavior. The objective measures of financial literacy and investor literacy tend to be better predictors of investing behaviors that are consistent with investing for the long-term, such as trading ETFs. The subjective measures are better predictors with investing behaviors that tend to be riskier, such as trading options. While these findings are valuable to understanding the new generation of investors, it is important to note that the findings in this paper are mostly descriptive, and do not imply causality.

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Appendix

Financial Literacy questions

Survey Item	Response Categories
Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?	A) More than \$102 B) Exactly \$102 C) Less than \$102 D) Don't know
Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, with the money in this account, would you be able to buy..."	A) More than today B) Exactly the same as today C) Less than today D) Don't know
Do you think the following statement is true or false? Buying a single company stock usually provides a safer return than a stock mutual fund.	A) True B) False C) Don't know
A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less.	A) True B) False C) Don't know
Assume a friend inherits \$10,000 today and his sibling inherits \$10,000 but 3 years from now. Who is richer today because of the inheritance?	A) My Friend B) His sibling C) They are equally rich D) Don't know
Suppose that in the year 20xx, your income has doubled and prices of all goods have doubled too. In 20xx, will you be able to buy more, the same or less than today with your income?	A) More than today B) The same as today C) Less than today D) Don't know
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
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
Do you think that the following statement is true or false? Stocks are normally riskier than bonds.	A) True B) False C) Don't know
Considering a long period (for example 10 or 20 years), what normally gives the highest return?	A) Savings accounts B) Bonds C) Stocks D) Don't know

Normally, which asset described below displays the highest fluctuations over time: savings accounts, bonds or stocks?	A) Savings accounts B) Bonds C) Stocks D) Don't know
When an investor spreads his or her money among different assets, does the risk of losing a lot of money increase, decrease, or stay the same?	A) Increase B) Decrease C) Stay the same D) Don't know
If interest rates rise, what will typically happen to bond prices?	A) They will rise B) They will fall C) They will stay the same D) There is no relationship between bond prices and the interest rate E) Don't know

Investor Literacy Questions

Survey Item	Response Categories
If you buy a company's stock	A) You own a part of the company B) You have lent money to the company C) You are liable for the company's debts D) The company will return your original investment to you with interest E) Don't know
If you buy a company's bond	A) You own a part of the company B) You have lent money to the company C) You are liable for the company's debts D) You can vote on shareholder resolutions E) Don't know
If a company files for bankruptcy, which of the following securities is most at risk of becoming virtually worthless?	A) The company's preferred stock B) The company's common stock C) The company's bonds D) Don't know
In general, investments that are riskier tend to provide higher returns over time than investments with less risk.	A) True B) False C) Don't know
The past performance of an investment is a good indicator of future results.	A) True B) False C) Don't know
Over the last 20 years in the US, the best average returns have been generated by:	A) Stocks B) Bonds C) CDs D) Money market accounts E) Precious metals F) Don't know
What is the main advantage that index funds have when compared to actively managed funds?	A) Index funds are generally less risky in the short term B) Index funds generally have lower fees and expenses C) Index funds are generally less likely to decline in value D) Don't know

Which of the following best explains why many municipal bonds pay lower yields than other government bonds?	A) Municipal bonds are lower risk B) There is a greater demand for municipal bonds C) Municipal bonds can be tax-free D) Don't know
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?	A) \$500 B) \$250 C) \$0 D) Don't know
Which is the best definition of "selling short?"	A) Selling shares of a stock shortly after buying it B) Selling shares of a stock before it has reached its peak C) Selling shares of a stock at a loss D) Selling borrowed shares of a stock E) Don't know

Screenshot of subjective probability elicitation question

For the previous three questions, you could have answered between zero and three correctly. We would like to know how many you think you got correct.

Please tell us the percent chance that you got..

All three correct

Exactly two correct

Exactly one correct

No correct answers

Total