

A Household View of Making Purchases on Margin: Focusing on Divergence in Investment Literacy and Advice Seeking Behavior

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Abstract

A great deal of research has studied the use of margin from an overall market perspective. However, very little has been observed regarding household decisions around margin use. The 2018 wave of the National Financial Capability Study Investor Survey provides unique insight into household margin use, and these new variables have made studying margin use on a household level possible. This study investigates the relation between both objective and subjective investment literacy, as well as the divergence in investment literacy and margin use. Results indicate that respondents who have a higher level of subjective investment literacy than objective investment literacy (investors who think they know more than they actually do) have a higher probability of buying on margin. This finding appears to be even more pronounced for respondents who receive investment advice from brokers compared to those who do not.

Introduction

As of January 2020, debit balances in customers' margin accounts for financial securities exceeded \$527 million dollars (FINRA, 2020). These debit balances represent an opportunity, and a cost, to increase buying power in an effort to improve portfolio returns. Margin debt is used to fund a wide variety of goals, such as buying vehicles, renovating homes, and helping children through college. When investors make the decision to buy on margin, they use their portfolios as collateral, which commonly experience greater volatility than other forms of collateral (e.g., personal residence, car, etc.). Therefore, an investor deciding to borrow on margin must not only consider the terms of the loan, but the stability of the portfolio, market prospects, and accessibility to other funds in the event of an economic downturn.

The decision to buy on margin is similar to other consumer decisions. Juster and Shay (1964) reveal why individuals might make purchases on margin when they compare individual and corporate investment in debt. Much like a corporation that weighs options when considering taking a loan to improve profits, an individual will borrow on margin only when they perceive that the financial and psychological benefits outweigh the financial and psychological costs associated with the debt. In this context, if an individual expects a net increase in utility, considering all costs, they are likely to choose to buy on margin.

The majority of the literature on margin buying has concentrated on the effects margin requirements and margin purchases have on the market as opposed to individual investors. For example, as margin requirements decrease, the amount of margin available to investors increases, resulting in higher price volatility and trading volume (Zhang & Li, 2013). Similar results are found in Japanese stock markets (Hardouvelis & Peristiani, 1992). In addition, buying on margin may lead to speculative stock bubbles when the market prohibits short selling (Ackert et al., 2006). Observing individual investment behavior using simulated data, Ayres and Nalebuff (2008) argue that younger investors who face liquidity constraints may only be able to have a diversified portfolio of stocks by borrowing on margin.

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Investors can decide to purchase securities or non-securities on margin by using their own human capital or by renting the human capital of an expert. The use of an investor's own human capital to make margin purchases can be assessed by measuring their objective and subjective investment literacy. Objective investment literacy is an investor's actual investment knowledge whereas subjective investment literacy is an investor's perception of their investment knowledge. Renting the human capital of a financial expert is an alternative way for an investor to decide whether to make a margin purchase. The investor has different options when deciding to rent the human capital of a financial expert, as they can hire a broker or a financial advisor.

This study seeks to build on existing literature by observing margin use from a household perspective. The 2018 wave of the National Financial Capability Study (NFCS) Investor Survey permits a deeper view of margin behavior than was previously available. This study performs a cross-sectional analysis of investors who use margin to purchase securities and non-securities. Subjective investment literacy, objective investment literacy, and the divergence between them are analyzed along with advice seeking behavior. Results indicate that both financial advice and investment literacy are highly relevant to the decision to purchase on margin.

Literature Review

Buying on margin involves the purchase of assets using one's portfolio as collateral. Therefore, the decision to buy on margin is both a debt and an investment decision. The following review will focus on financial literacy (i.e., objective, subjective, and divergence) and advice seeking behavior from both a debt and an investment perspective. While previous studies have focused primarily on financial literacy, this study will focus on investment literacy as a domain-specific form of financial literacy.

Buying on Margin as a Debt Decision

One factor associated with debt decisions is financial literacy. Financial literacy is a form of human capital and enables individuals to compare the pros and cons of engaging in debt more efficiently. In a study of high-cost borrowing behaviors, Chatterjee (2013) found that lower levels of financial literacy are associated with engaging more frequently in costly debt decisions. Additionally, individuals in the United States who are more financially literate do not have as much debt compared to those who are not as financially literate (Lusardi & Tufano, 2009). These findings are similar to Disney and Gathergood (2011) and Brown and Graf (2013) who conducted studies in the U.K. and Switzerland, respectively. Finally, Verma (2017) examined how subjective financial knowledge is formed from household biases, how it affects financial behavior, and how it differs from objective financial knowledge. Using the 2015 NFCS (a previous and more general version of the dataset used in this study), Verma (2017) showed that individuals who have higher subjective financial knowledge, relative to objective financial knowledge, tend to have more debt.

Furthermore, the decision of whether or not to seek financial advice influences choices around debt. Consumer demand theory implies that individuals demand advice when the expected benefit of advice exceeds the expected costs. Potential benefits of seeking advice include foregoing the costs associated with personal research and making better-informed decisions (Ratchford, 2001). Specifically, focusing on the benefits of receiving advice on debt, prior studies indicate that individuals who receive advice experience reduced debt levels and exhibit better overall debt behaviors (Staten et al., 2002). However, where advisor incentives do not align with the desires of their clients, agency theory predicts less-than-optimal outcomes (Akerlof, 1978; Eisenhardt, 1989; Inderst & Ottaviani, 2010). In a previous study, Van Ooijen & Rooij, 2016) showed this disconnect between the incentives of advisors and clients by relating mortgage loan decisions to financial knowledge and advice. They found that homeowners with lower levels of financial literacy who consult with brokers hold riskier mortgages (e.g., high loan-to-income ratios with complex features) than those who do not.

Buying on Margin as an Investment Decision

Financial literacy has been linked to household investment decisions and is a form of investment in human capital (Lusardi & Mitchel, 2014). Higher financial literacy provides opportunities that would have otherwise been unavailable. For example, financially literate individuals invest more in stocks than less financially literate individuals (Rooij et al., 2011). Furthermore, individuals whose subjective financial literacy is greater than their objective financial literacy invest more in risky assets like stocks (Verma, 2017).

For many, financial advice plays a major role in determining investment allocation. Several studies indicate that receiving financial advice is associated with better portfolio diversification. One such

study is that of Von Gaudecker (2015), who examined how household portfolio diversification varies with financial advice. The paper found that compared to households that rely on their own decision-making abilities, households who obtain financial advice from professionals are more likely to have more diversified portfolios and achieve better investment outcomes (similarly found by Bluethgen et al., 2008, Gerhardt & Hackethal, 2009, and Mullainathan et al., 2010). However, Muller (2008), which looked at investment advice in retail banks, specifically comparing advice and non-advised investors of a retail bank found that financial advice could be costly. They found that, although investors who received advice had lower portfolio risk exposure, they purchased more expensive investment products and incurred higher transaction costs (similarly found by Bergstresser et al., 2009).

There is a paucity of literature examining the factors that influence individual decisions to buy on margin. This paper examines factors that affect individual decisions to buy stocks and other assets on margin – more specifically, investment literacy, the divergence of subjective and objective investment literacy, and financial advice.

Data

This study uses data from the 2018 wave of the National Financial Capability Study (NFCS) Investor Survey. This nationwide survey is a follow-up survey from the more broad-based NFCS State-by-State Survey. Both surveys have been commissioned by the FINRA Investor Education Foundation and conducted by Applied Research and Consulting LLC (ARC). The NFCS Investor Survey was conducted to take a deeper look at factors associated with investor decisions. The online survey was administered to 2,003 individuals who hold investments outside of retirement accounts. Weighting, which is provided based on data from the American Community Survey, is used to make the sample representative of the United States population.

Several observations from the sample were recoded as missing. Responses such as “Don’t know” and “Prefer not to say” are omitted from the sample in most instances. After accounting for missing values, the sample is reduced from 2,003 observations to 472 observations when the dependent variable is use of margin to purchase securities and 1,494 observations when the dependent variable is using stocks as collateral for purchasing non-securities.

The dependent variables used in this study include the decision to buy securities and other assets on margin. These variables are measured based on responses to the following questions: “Have you made any securities purchases on margin?” and “Some investment firms offer you the option to use your investment accounts as collateral...for other purposes, such as buying a car or renovating a home. Do you have this type of loan or line of credit?” Respondents who state “Don’t know” were combined with those who respond “No” to these questions. Each of these dependent variables enter their respective model as dummy variables, with “No” being the omitted category.

Objective investment literacy is measured using ten questions on investment knowledge (see appendix). The objective investment literacy score is created by summing all correct responses to the financial knowledge questions (the lowest score is 0 and the highest score is 10). When respondents state “Don’t know” in response to an investment literacy question, the response is coded as incorrect. When respondents state “Prefer not to say”, responses are dropped. Subjective investment literacy is measured using a question that asks respondents to assess their own level of financial knowledge. Subjective investment literacy is reported on a scale of 1 to 7 (with 1 being low and 7 being high). To bring these two variables into similar units so that they can be compared, each variable is standardized with a mean of zero and a standard deviation of one.

In a separate model, in order to create a measure of divergence in investment literacy, the standardized variable of objective investment literacy is subtracted from the standardized subjective investment literacy variable. From this calculation, it is inferred that a positive number would indicate having greater subjective than objective investment literacy. The investment literacy divergence variable is a continuous measure.

The source of financial advice is another explanatory variable included in the analysis. Respondents are asked to indicate, “Which of the following information sources do you use when making an investment decision?” Respondents can choose “Stockbrokers” (yes or no) and “Financial advisors other than stockbrokers” (yes or no). The stockbroker and financial advisor variables are included in the model as dummy variables.

Financial risk tolerance was captured based on responses to the following question: “Which of the following statements comes closest to describing the amount of financial risk that you are willing to take

when you save or make investments?” Response options include: “Take substantial financial risks expecting to earn substantial returns,” “Take above average financial risks expecting to earn above average returns,” “Take average financial risks expecting to earn average returns,” and “Not willing to take any financial risks.” Each response option is treated as a dichotomous variable where “Not willing to take on any financial risk” is the reference category.

Stock market expectations were measured by asking respondents the following question: “What do you expect the approximate average annual return of the S&P 500 stock index to be over the next 10 years (without adjusting for inflation)?” Response options range from “Less than 0% (a negative return)” to “20% or more”. Responses are organized into four groups: less than 4.9%, 5%-9.9%, 10%-14.9%, and 15% or more. A dummy variable is created for each response option with less than 4.9% as the omitted category.

The value of non-retirement investment accounts and income are both reported categorically. Respondents are asked “What is the approximate total value of all of your investments in non-retirement accounts?” Response options ranged from “Less than \$2,000” to “\$1,000,000 or more.” The value of non-retirement investment accounts is grouped into quartiles, with the lowest quartile as the reference category. Respondents report income as “<\$50K”, “\$50 – \$100k”, and “\$100K+”. These response options are coded as dummy variables with “<50K” as the reference category.

Age, gender, education, and ethnicity are also included in the model as categorical variables. Respondents can choose from the following groups for age: “18-34”, “35-54”, and “55+”. Age “18-34” is the reference category. Gender is a dichotomous variable with “Male” as the reference category. Respondents report their level of education as either “Some college or less (incl. Associate’s degree)” or “College grad (Bachelor’s) or more.” Each response option is represented in the model by a dummy variable with “Some college or less (incl. Associate’s degree)” as the reference category. Ethnicity is reported as either “White Alone (Non-Hispanic)” or “Non-White”. It is measured as a dummy variable with “White Alone (Non-Hispanic)” as the reference group.

Methodology

This paper estimates the following probit model:

$$Y_i^* = \beta_0 + \beta X_i + \varepsilon$$

$$Y_i = 1 \text{ if } Y_i^* > 0 \text{ (buy on margin)}$$

$$Y_i = 0 \text{ if } Y_i^* \leq 0 \text{ (does not buy on margin)}$$

where Y_i^* is a latent measure of the decision of an individual i to buy securities or other assets on margin. Y_i is the observed dependent variable (the decision to buy securities or other assets on margin) of an individual i . β_0 is the intercept, while β is a vector of coefficients showing the association of the independent variables with the latent variable. X_i is a matrix that consists of predictor variables including investment literacy, divergence in investment literacy, source of financial advice for individual i . The model also contains demographic and socioeconomic variables which includes: risk tolerance, portfolio value, stock market expectations, age, ethnicity, gender, education, and income. ε is the error term, which is assumed to follow a normal distribution.

The relation between investment literacy and margin purchases is theoretically ambiguous. Individuals with high levels of investment literacy are better equipped with the skill set to effectively weigh the benefits and costs of engaging in margin purchasing than those with lower levels of investment literacy, and are expected to make decisions that are closer to what is optimal. However, problems may arise when these individuals believe they know more than they do – when their objective investment literacy is lower than their subjective investment literacy. This divergence in investment literacy may cause individuals to underestimate the risks associated with different options and result in engaging in risky positions without properly analyzing the situation (Kumar & Goyal 2015; Pak & Chatterjee 2016). Hence, a person with a positive divergence in literacy (i.e., subjective investment literacy greater than objective investment literacy) may underestimate the risk of buying on margin, and engage in margin purchasing without weighing effectively the risks and rewards associated with it.

Due to the complexity of buying on margin, if individuals lack relevant information, they may make sub-optimal choices (McCall, 1970). Therefore, financial advice may play a key role in helping investors avoid making costly mistakes by providing higher quality information (Bluethgen et al., 2008). However, the source of advice may impact the information individuals receive. For instance, brokers may be more likely to encourage the use of margin, as their firms receive interest payments made for purchases on margin. This incentive may not be present for financial advisors, who are less likely to receive direct

compensation for margin purchases. Therefore, if financial advice is received from a broker, a positive relation is expected with margin purchasing.

Based on expected utility theory, risk tolerance is predicted to be associated positively with buying on margin. Margin purchasing is both a debt and an investment decision, since it involves using currently owned investments as collateral to purchase new assets. The value of these assets may fluctuate, which makes buying on margin as a debt decision particularly risky. Individuals who are less risk averse should engage more in margin purchasing because they experience lower reductions to utility when they engage in risky positions compared to risk averse individuals with higher risk aversion. Therefore, a positive relationship is expected between risk tolerance and buying on margin.

Expectations of stock market returns are expected to be associated positively with buying on margin. Based on expected utility theory, individuals should buy on margin when they expect such purchases to increase their portfolio returns. Higher portfolio returns should drive higher consumption, which should increase utility.

The value of an individual's nonretirement investment portfolio and income are expected to be positively related to their decision to buy on margin. In a study of factors that affect debt behavior, Crook (2010) found that households with higher income tend to acquire more debt. Another study focusing on the macroeconomic factors that affect the decision to participate in the stock market found that higher levels of income are associated with greater participation in the stock market (Valeriano & Liu 2019). Relating wealth and investment, Carroll (2000) found that individuals with greater wealth invest more frequently and do so in riskier positions.

Demographic variables such as age, gender, and ethnicity are included as proxies for preferences that may affect the decision to buy on margin and cannot be determined *a priori*.

In summary, based on the above theoretical expectations and previous empirical findings, the following hypotheses are tested:

H1: A positive association between divergence in objective and subjective investment literacy and margin purchase

H2: A positive relation between seeking advice from a broker and buying on margin

Results

Table 2 displays the results of a probit analysis for both dependent variables (i.e., margin used to purchase securities and margin used to purchase assets other than securities).

Results are significant when observing the relation between objective investment literacy and margin use. In addition, self-assessed investment knowledge is associated positively with using margin to purchase securities and non-securities. The relation between subjective and objective investment knowledge divergence and using margin to purchase securities and non-securities can be found in Table 3. A greater divergence (i.e., higher subjective than objective investment literacy) is associated with a higher probability of purchasing securities and non-securities on margin.

Seeking financial advice from a broker is positively associated with each dependent variable. A positive association is found for seeking advice from an advisor and using margin to purchase non-securities. Figures 1 and 2 display the interaction effects of receiving advice from a broker and investment literacy divergence. These figures show that the probability of buying on margin intensifies for those who receive advice from a broker (relative to those who do not receive advice from a broker) as the divergence in investment literacy increases.

Along with these findings, risk tolerance, return expectations of the S&P 500, and age are all significantly associated with margin utilization. Risk tolerance is found to be associated positively with using margin (both for securities and non-securities). Higher expectations of S&P 500 returns, relative to the lowest quartile, are associated negatively with using margin to purchase securities and associated positively with using margin to purchase non-securities. Finally, respondents age 55 years and older have a negative association with making purchases on margin (both securities and non-securities) when compared to respondents ages 18-34 years old.

Discussion

Given the paucity of literature on factors that affect an investor's decision to buy on margin, this study sought to determine the relation between investment literacy and the decision to make purchases using margin. This was accomplished by observing subjective and objective investment literacy separately and, in a separate model, observing the divergence between subjective and objective

investment literacy. Furthermore, this study examined the association of information seeking (from an advisor/broker) on margin purchase decisions.

Results indicate that the divergence between subjective and objective investment literacy is positively related to the decision to use margin to buy securities and other assets. Verma (2017) referred to this divergence as financial illusion or overconfidence. According to Verma (2017), when individuals believe they know more than actually they do, they may become subject to overconfidence bias. This overconfidence bias may cause individuals to engage in riskier positions (such as a buying on margin) in a bid to outperform the market, without properly analyzing the situation (Kumar & Goyal 2015; Pak & Chatterjee 2016).

Furthermore, as can be seen in Figures 1 and 2, the association between the divergence in investment literacy and margin use differs for investors who receive advice from a broker compared to those who do not. Investors who seek advice from a broker are more likely to buy on margin than those who do not. Interestingly, the probability of buying on margin increases at a higher rate for investors using a broker, compared to not using a broker, as investment literacy divergence rises. This relation between advice from a broker and investment literacy divergence on margin use is observed when considering using margin to purchase securities and non-securities alike (the relation is more pronounced when buying securities on margin). If, as asserted by Verma (2017), a divergence in financial literacy is an indicator of financial illusion or overconfidence, individuals with greater levels of overconfidence may be more influenced by the advice of their brokers.

Implications and Conclusion

This study examined the relation between investment literacy divergence and the decision to buy securities and other assets on margin. Findings from this study show that respondents with a positive divergence between subjective and objective investment literacy are each more likely to participate in margin purchase. This indicates that there is a risk of individuals engaging in margin without appropriately weighing the costs and benefits of this decision. Although buying on margin can be used as an effective means to increase portfolio returns, it is very important that individuals who engage in transactions using margin are aware of the risks involved. Financial advisors may add further value to their clients by educating them around margin use, especially when working with clients who appear to be overly confident.

The finding that seeking financial advice from a broker is positively related to buying on margin aligns with our hypothesis as brokers may be incentivized to advise clients to buy on margin due to compensation incentives. There may be an opportunity for policy intervention given that margin buying may be greater among clients of brokers who have greater investment literacy divergence. From an advisor perspective, greater emphasis on education at the point of decision (e.g., when margin is enabled on the account) may be valuable in helping promote informed decision making, especially for investors who are overconfident.

The cross-sectional nature of these data represents a limitation. Future research could strengthen the present study by observing individual margin behavior longitudinally. However, to the best of our knowledge, there are no data sets tracking individual margin behavior longitudinally.

Further application of the divergence between subjective and objective investment literacy is likely to provide greater insights into areas where enhanced client protection from a policy perspective may be valuable. Performing a similar study on investment literacy divergence on other relatively high-risk decisions, for example, could inform policymakers and advisors alike on potential factors that influence financial decision making.

References

- Ackert, Lucy F., Narat Charupat, Bryan K. Church, and Richard Deaves. "Margin, Short Selling, and Lotteries in Experimental Asset Markets." *Southern Economic Journal* (2006): 419-436.
- Akerlof, George A. "The Market For "Lemons": Quality Uncertainty and the Market Mechanism." In *Uncertainty in Economics*, Pp. 235-251. Academic Press, 1978.
- Al-Tamimi, Hussein A. Hassan. "Financial Literacy and Investment Decisions of UAE Investors." *The Journal of Risk Finance* (2009).
- Anbar, Adem, and Melek Eker. "An Empirical Investigation for Determining of the Relation between Personal Financial Risk Tolerance and Demographic Characteristic." *Ege Academic Review* 10, No. 2 (2010): 503-523.
- Ayres, Ian, and Barry Nalebuff. "Diversification Across Time." *The Journal of Portfolio Management* 39, no. 2 (2013): 73-86.
- Bergstresser, Daniel, John MR Chalmers, and Peter Tufano. "Assessing the Costs and Benefits of Brokers in the Mutual Fund Industry." *The Review of Financial Studies* 22, No. 10 (2008): 4129-4156.
- Bhattacharya, Utpal, Andreas Hackethal, Simon Kaesler, Benjamin Loos, and Steffen Meyer. "Is Unbiased Financial Advice to Retail Investors Sufficient? Answers from a Large Field Study." *The Review of Financial Studies* 25, No. 4 (2012): 975-1032.
- Bluethgen, Ralph, Andreas Gintschel, Andreas Hackethal, and Armin Mueller. "Financial Advice and Individual Investors' Portfolios." *Available at SSRN 968197* (2008).
- Brown, Martin, and Roman Graf. "Financial Literacy, Household Investment and Household Debt: Evidence from Switzerland." (2012).
- Cardak, Buly A., and Roger Wilkins. "The Determinants of Household Risky Asset Holdings: Australian Evidence on Background Risk and Other Factors." *Journal of Banking & Finance* 33, No. 5 (2009): 850-860.
- Chatterjee, Swarn. "Borrowing Decisions of Credit Constrained Consumers and the Role of Financial Literacy." *Economics Bulletin* 33, No. 1 (2013): 179-191.
- Disney, Richard, and John Gathergood. "Financial Literacy and Indebtedness: New Evidence for UK Consumers." *The University of Nottingham* (2011): 11-05.
- Eisenhardt, Kathleen M. "Agency Theory: An Assessment and Review." *Academy Of Management Review* 14, No. 1 (1989): 57-74.
- Faff, Robert, Terrence Hallahan, and Michael Mckenzie. "Women and Risk Tolerance in an Aging World." *International Journal of Accounting & Information Management* (2011).
- Financial Industry Regulatory Authority, Inc. (2020). Margin Statistics. <https://www.finra.org/investors/learn-to-invest/advanced-investing/margin-statistics>
- Gerhardt, Ralf, and Andreas Hackethal. "The Influence of Financial Advisors on Household Portfolios: A Study on Private Investors Switching to Financial Advice." *Available At SSRN 1343607* (2009).
- Grable, John E. "Financial Risk Tolerance." In *Handbook of Consumer Finance Research*, Pp. 19-31. Springer, Cham, 2016.
- Hardouvelis, Gikas, and Steve Peristiani. "Do Margin Requirements Matter? Evidence from US and Japanese Stock Markets." *Quarterly Review* Win (1989): 16-35.
- Hariharan, Govind, Kenneth S. Chapman, and Dale L. Domian. "Risk Tolerance and Asset Allocation for Investors Nearing Retirement." *Financial Services Review* 9, No. 2 (2000): 159-170.
- Idris, Nur Hafidzah, Zarinah Abu Yazid, Fathin Ahmad Faique, Shahreena Daud, Mohammed Hariri Bakri, Shafinar Ismail, and Norraeffa Md Taib. "Financial Literacy and Debt Burden Among Malay Muslim Youth Workers in Malaysia." (2015).
- Inderst, Roman, And Marco Ottaviani. "Consumer Protection in Markets with Advice." *Competition Policy International* 6, No. 1 (2010): 47-64.
- Janor, Hawati, Rubayah Yakob, Noor Azuan Hashim, Zanariah Zanariah, And Che Aniza Che Wel. "Financial Literacy and Investment Decisions in Malaysia And United Kingdom: A Comparative Analysis." *Geografia-Malaysian Journal of Society and Space* 12, No. 2 (2017).
- Kumar, Satish, and Nisha Goyal. "Behavioural Biases in Investment Decision Making – A Systematic Literature Review." *Qualitative Research in Financial Markets* (2015).

- Lin, Judy T., and Mottola, Gary. "Investors in the United States: A Report of the National Financial Capability Study". *FINRA Investor Education Foundation* (2019).
- Luckett, Dudley G. "On the Effectiveness of The Federal Reserve's Margin Requirement." *The Journal of Finance* 37, No. 3 (1982): 783-795.
- Lusardi, Annamaria, and Carlo De Bassa Scheresberg. *Financial Literacy and High-Cost Borrowing in the United States*. No. W18969. National Bureau of Economic Research, 2013.
- Mullainathan, Sendhil, Markus Noeth, and Antoinette Schoar. *The Market for Financial Advice: An Audit Study*. No. W17929. National Bureau of Economic Research, 2012.
- Pak, Tae-Young, and Swarn Chatterjee. "Aging, Overconfidence, and Portfolio Choice." *Journal of Behavioral and Experimental Finance* 12 (2016): 112-122.
- Ratchford, Brian T. "The Economics of Consumer Knowledge." *Journal of Consumer Research* 27, No. 4 (2001): 397-411.
- Santa-Clara, Pedro, and Alessio Saretto. "Option Strategies: Good Deals and Margin Calls." *Journal of Financial Markets* 12, No. 3 (2009): 391-417.
- Snelbecker, Glenn E., Michael J. Roszkowski, and Neal E. Cutler. "Investors' Risk Tolerance and Return Aspirations, and Financial Advisors' Interpretations: A Conceptual Model and Exploratory Data." *Journal of Behavioral Economics* 19, No. 4 (1990): 377-393.
- Staten, Michael E., Gregory Elliehausen, and E. Christopher Lundquist. "The Impact of Credit Counseling on Subsequent Borrower Credit Usage and Payment Behavior." Credit Research Center Monograph 36 (2002): 1-38.
- Xiao, Jing Jian. "Applying Behavior Theories to Financial Behavior." *Handbook of Consumer Finance Research*, Pp. 69-81. Springer, New York, NY, 2008.
- Van Rooij, Maarten, Annamaria Lusardi, and Rob Alessie. "Financial Literacy and Stock Market Participation." *Journal of Financial Economics* 101, No. 2 (2011): 449-472.
- Von Gaudecker, Hans-Martin. "How Does Household Portfolio Diversification Vary with Financial Literacy and Financial Advice?" *The Journal of Finance* (2015): 489-507.
- Verma, Rahul. "Role of Self Deception, Overconfidence and Financial Aliteracy in Household Financial Decision Making." *Journal of Applied Business and Economics* 19, No. 8 (2017): 94-109.
- Yuh, Yoonkyung, and Sharon A. Devaney. "Determinants of Couples' Defined Contribution Retirement Funds." *Journal of Financial Counseling and Planning* 7 (1996): 31.
- Zhang, Ting, and Honggang Li. "Buying on Margin, Selling Short in an Agent-Based Market Model." *Physica A: Statistical Mechanics and Its Applications* 392, No. 18 (2013): 4075-4082.

Table 1. Summary Statistics: Organized by Margin Used to Purchase Securities and Margin Used to Purchase Other Assets

Variables	Margin Used to Purchase Securities	Margin Used to Purchase Other Assets
Dependent Variable		
Margin use		
No	0.513 (0.028)	0.723 (0.015)
Yes	0.487 (0.028)	0.277 (0.015)
Independent Variables		
Objective investment literacy		
0	0.006 (0.006)	0.005 (0.003)
1	0.031 (0.012)	0.028 (0.006)
2	0.111 (0.020)	0.080 (0.010)
3	0.161 (0.022)	0.134 (0.012)
4	0.197 (0.023)	0.189 (0.013)
5	0.115 (0.017)	0.164 (0.012)
6	0.082 (0.013)	0.121 (0.010)
7	0.061 (0.011)	0.099 (0.008)
8	0.087 (0.013)	0.078 (0.008)
9	0.090 (0.012)	0.060 (0.006)
10	0.060 (0.010)	0.041 (0.006)
Subjective investment literacy		
1	0.006 (0.006)	0.016 (0.004)
2	0.004 (0.003)	0.021 (0.004)
3	0.039 (0.011)	0.067 (0.008)
4	0.092 (0.017)	0.177 (0.012)
5	0.285 (0.024)	0.347 (0.015)
6	0.334 (0.025)	0.244 (0.014)
7	0.241 (0.025)	0.128 (0.012)
Investment Literacy Divergence (Subjective – Objective Literacy)	0.593 (0.076)	0.170 (0.043)
Seek information from advisor		
No	0.357 (0.025)	0.385 (0.015)
Yes	0.643	0.615

	(0.025)	(0.015)
Seek information from broker		
No	0.559	0.696
	(0.027)	(0.015)
Yes	0.441	0.304
	(0.027)	(0.015)
Risk tolerance		
Willingness to take financial risks		
Not willing to take on any	0.026	0.071
	(0.009)	(0.008)
Average	0.332	0.468
	(0.025)	(0.016)
Above average	0.422	0.339
	(0.027)	(0.015)
Substantial financial risks	0.220	0.122
	(0.025)	(0.012)
Average annual expectations of S&P 500		
Less than 4.9%	0.161	0.212
	(0.019)	(0.013)
5% to 9.9%	0.423	0.484
	(0.027)	(0.016)
10% to 14.9%	0.254	0.202
	(0.025)	(0.014)
15% or more	0.162	0.102
	(0.022)	(0.011)
Value of non-retirement accounts		
Less than \$2,000	0.040	0.069
	(0.013)	(0.009)
\$2,000 to less than \$5,000	0.051	0.051
	(0.014)	(0.008)
\$5,000 to less than \$10,000	0.059	0.061
	(0.015)	(0.008)
\$10,000 to less than \$25,000	0.080	0.085
	(0.016)	(0.010)
\$25,000 to less than \$50,000	0.097	0.093
	(0.017)	(0.010)
\$50,000 to less than \$100,000	0.187	0.148
	(0.022)	(0.012)
\$100,000 to less than \$250,000	0.172	0.172
	(0.020)	(0.012)
\$250,000 to less than \$500,000	0.137	0.139
	(0.017)	(0.010)
\$500,000 to less than \$1,000,000	0.083	0.096
	(0.013)	(0.008)
\$1,000,000 or more	0.093	0.086
	(0.013)	(0.008)
Income		
<\$50K	0.285	0.276
	(0.027)	(0.015)
\$50-\$100K	0.384	0.417
	(0.027)	(0.016)
\$100k+	0.331	0.306
	(0.024)	(0.014)
Education		
Some college or less	0.535	0.527
	(0.027)	(0.016)

College grad or more	0.465 (0.027)	0.473 (0.016)
Gender		
Male	0.675 (0.026)	0.617 (0.016)
Female	0.325 (0.026)	0.383 (0.016)
Age		
18-34	0.382 (0.029)	0.259 (0.017)
35-54	0.311 (0.024)	0.294 (0.014)
55+	0.307 (0.022)	0.447 (0.015)
Ethnicity		
White Alone	0.672 (0.027)	0.756 (0.015)
Non-White	0.328 (0.027)	0.244 (0.015)
<i>N</i>	438	1,251

Note: Data from 2018 NFCS Investor Survey. Means and standard errors (in parenthesis) displayed.

Table 2. Results of Probit Regressions Including Financial Literacy Score (Objective) and Self-assessment of Financial Knowledge (Subjective).

Independent Variable	Margin use: Securities		Margin use: Non-securities	
Objective investment literacy	-0.064	**	-0.074	**
	(0.023)		(0.014)	
Subjective investment literacy	0.085	**	0.034	*
	(0.028)		(0.016)	
Seek advice: advisor (Ref: No)	-0.019		0.064	*
	(0.044)		(0.026)	
Seek advice: broker (Ref: No)	0.107	*	0.203	**
	(0.047)		(0.033)	
Risk tolerance (Willingness to take risk) (Ref: Not willing to take risks)				
Average	0.185		0.030	
	(0.137)		(0.045)	
Above average	0.348	*	0.054	
	(0.138)		(0.048)	
Substantial financial risk	0.539	**	0.201	**
	(0.141)		(0.065)	
Expected returns for S&P 500 (Ref: ≤ 4.9%)				
5% - 9.9%	-0.119	*	0.031	
	(0.059)		(0.031)	
10% - 14.9%	0.028		0.059	
	(0.068)		(0.039)	
15% or more	-0.138		0.114	*
	(0.077)		(0.051)	
Value of non-ret. investment: Quartiles (Ref: Lowest)				
2	0.094		0.049	
	(0.058)		(0.032)	
3	0.059		0.071	
	(0.069)		(0.040)	
4	0.028		0.060	
	(0.072)		(0.039)	
Income (Ref: <\$50K)				
\$50-\$100K	-0.048		-0.013	
	(0.062)		(0.032)	
\$100K+	-0.090		-0.030	
	(0.070)		(0.036)	
Education: College grad or more (Ref: Some college or less)	0.072		-0.014	
	(0.049)		(0.026)	
Gender: Female (Ref: Male)	-0.011		-0.015	
	(0.046)		(0.026)	
Age (Ref: 18-34)				
35-54	-0.104		-0.084	*
	(0.065)		(0.041)	
55+	-0.250	**	-0.134	**
	(0.072)		(0.042)	
Ethnicity: Non-White (Ref: White alone)	0.005		0.052	
	(0.050)		(0.042)	

N

438

1,251

Note: Results of a probit regression using data from the 2018 NFCS Investor Survey. Two dependent variables: margin used to purchase securities and margin used to purchase non-securities. Marginal effects are displayed above with standard errors being displayed parenthetically. ** $p < 0.01$; * $p < 0.05$

Table 3. Results of Probit Regressions Including Divergence between Subjective and Objective Financial Literacy.

Independent Variable	Margin use: Securities		Margin use: Non-securities	
Investment Literacy Divergence (Subjective – Objective Literacy)	0.075 (0.019)	**	0.053 (0.011)	**
Seek advice: advisor (Ref: No)	-0.019 (0.045)		0.069 (0.026)	**
Seek advice: broker (Ref: No)	0.106 (0.047)	*	0.205 (0.033)	**
Risk tolerance (Willingness to take risk) (Ref: Not willing to take risks)				
Average	0.176 (0.138)		0.026 (0.047)	
Above average	0.345 (0.138)	*	0.042 (0.049)	
Substantial financial risk	0.535 (0.142)	**	0.190 (0.066)	**
Expected returns for S&P 500 (Ref: ≤ 4.9%)				
5% - 9.9%	-0.116 (0.060)	*	0.023 (0.031)	
10% - 14.9%	0.028 (0.068)		0.057 (0.039)	
15% or more	-0.138 (0.077)		0.112 (0.052)	*
Value of non-ret. investment: Quartiles (Ref: Lowest)				
2	0.096 (0.057)		0.041 (0.032)	
3	0.059 (0.068)		0.062 (0.040)	
4	0.037 (0.070)		0.041 (0.038)	
Income (Ref: <\$50K)				
\$50-\$100K	-0.048 (0.062)		-0.013 (0.033)	
\$100K+	-0.088 (0.071)		-0.035 (0.036)	
Education: College grad or more (Ref: Some college or less)	0.078 (0.047)		-0.023 (0.026)	
Gender (Ref: Male)	-0.013 (0.045)		-0.005 (0.025)	
Age (Ref: 18-34)				
35-54	-0.099 (0.064)		-0.087 (0.041)	*
55+	-0.241 (0.070)	**	-0.138 (0.042)	**
Ethnicity: Non-white (Ref: White alone)	0.004 (0.050)		0.049 (0.033)	
<i>N</i>	438		1,251	

Note: Results of a probit regression using data from the 2018 NFCS Investor Survey. Two dependent variables: margin used to purchase securities and margin used to purchase non-securities. Divergence between financial literacy created by subtracting standardized financial literacy score (objective) from standardized self-assessed knowledge (subjective). Marginal effects are displayed above with standard errors being displayed parenthetically. ** $p < 0.01$; * $p < 0.05$

Table 4a. Results of Probit Regression Including Interaction of Divergence and Seeking Advice from a Broker: Margin Used to Purchase Securities.

Independent Variable	Information received from broker:		
	Yes	No	
Interaction: Financial literacy divergence and seeking advice			
1	0.150 (0.086)		0.178 (0.071) *
2	0.190 (0.088)	*	0.202 (0.070) **
3	0.243 (0.086)	**	0.234 (0.066) **
4	0.313 (0.078)	**	0.275 (0.060) **
5	0.395 (0.063)	**	0.323 (0.050) **
6	0.485 (0.048)	**	0.377 (0.040) **
7	0.575 (0.043)	**	0.434 (0.039) **
8	0.658 (0.051)	**	0.493 (0.048) **
9	0.729 (0.062)	**	0.549 (0.063) **
10	0.786 (0.069)	**	0.600 (0.076) **
N	438		1,251

Note: Results of a probit regression using data from the 2018 NFCS Investor Survey. Dependent variable: margin used to purchase securities. Divergence between financial literacy created by subtracting standardized financial literacy score (objective) from standardized self-assessed knowledge (subjective). Divergence is then interacted with seeking information from a broker. Marginal effects displayed represent means at ten equidistant points along full range of possible outcomes for divergence variable. Standard errors are displayed parenthetically. ** $p < 0.01$; * $p < 0.05$

Figure 1. Interaction of Divergence in Investment Literacy and Receiving Advice from a Broker when Purchasing Securities on Margin.

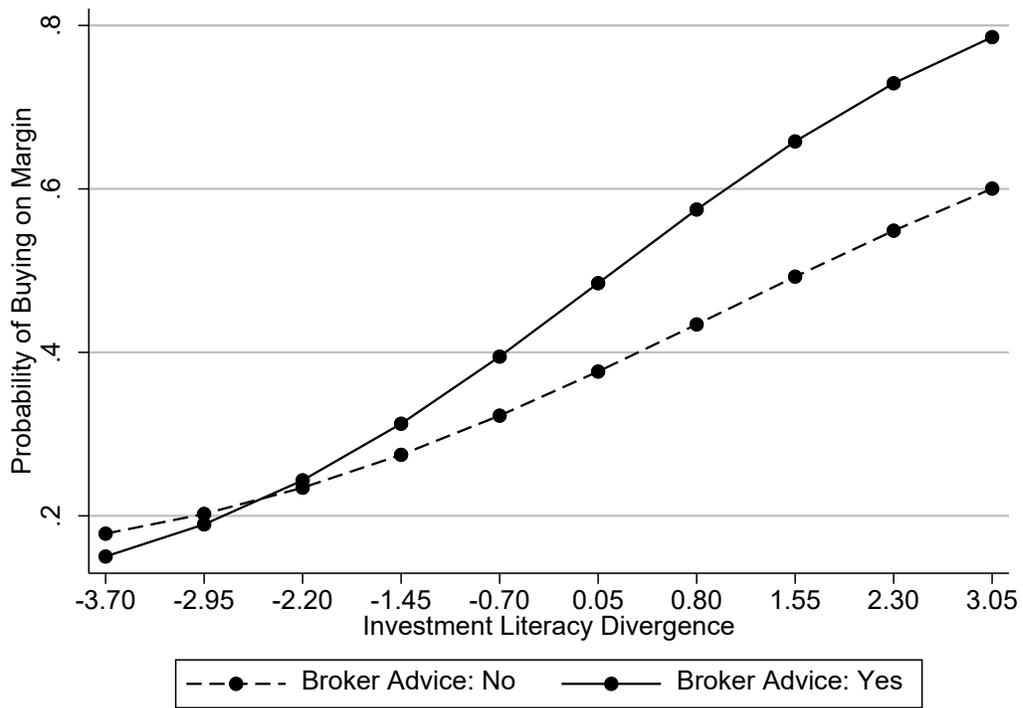
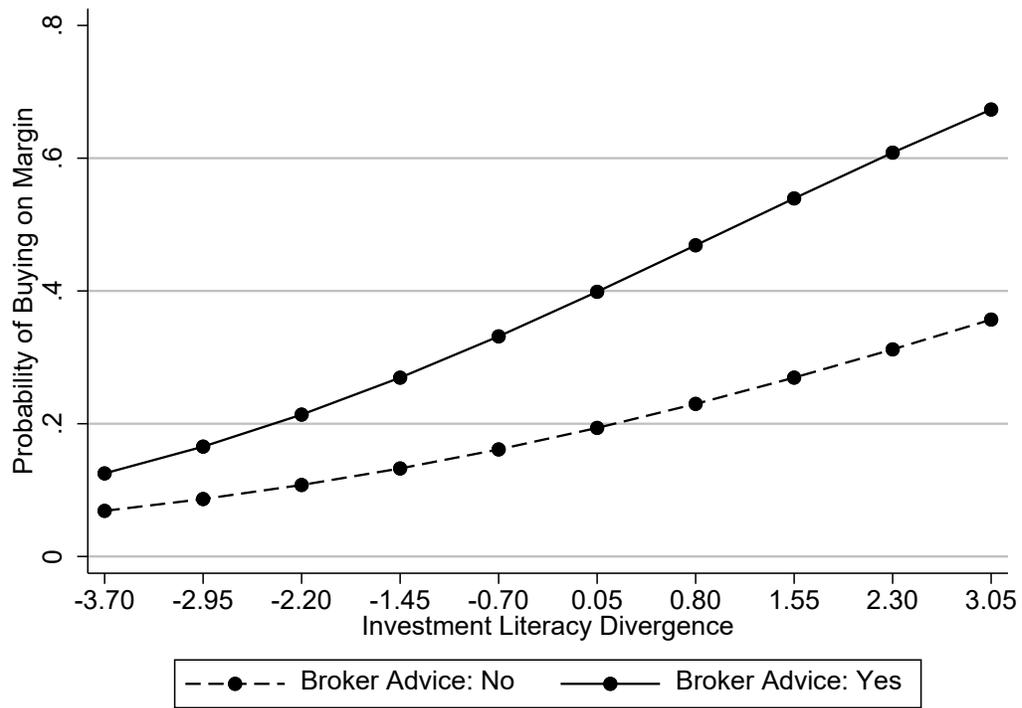


Figure 2. Interaction of Divergence in Investment Literacy and Receiving Advice from a Broker when Purchasing Non-securities on Margin.



APPENDIX

Note: Each of the following questions include the response options “Don’t know” and “Prefer not to say.”

Dependent Variables:*Margin used to purchase securities:*

Have you made any securities purchases on margin?

- 1) Yes
- 2) No

Margin used to purchase non-securities:

Some investment firms offer you the option to use your investment accounts as collateral for a loan or line of credit. You cannot use the borrowed money to purchase securities, but you can use it for other purposes, such as buying a car or renovating a home.

Do you have this type of loan or line of credit?

- 1) Yes
- 2) No

Independent Variables:*Subjective financial literacy:*

On a scale from 1 to 7, where 1 means very low and 7 means very high, how would you assess your overall knowledge about investing?

Objective financial literacy:

If you buy a company's stock...

- 1) You own a part of the company
- 2) You have lent money to the company
- 3) You are liable for the company's debts
- 4) The company will return your original investment to you with interest

If you buy a company's bond...

- 1) You own a part of the company
- 2) You have lent money to the company
- 3) You are liable for the company's debts
- 4) The company will return your original investment to you with interest

If a company files for bankruptcy, which of the following securities is most at risk of becoming virtually worthless?

- 1) The company's preferred stock
- 2) The company's common stock
- 3) The company's bonds

In general, investments that are riskier tend to provide higher returns over time than investments with less risk.

- 1) True
- 2) False

The past performance of an investment is a good indicator of future results.

- 1) True
- 2) False

Over the last 20 years in the US, the best average returns have been generated by:

- 1) Stocks
- 2) Bonds
- 3) CDs
- 4) Money market accounts
- 5) Precious metals

What is the main advantage that index funds have when compared to actively managed funds?

- 1) Index funds are generally less risky in the short term
- 2) Index funds generally have lower fees and expenses

3) Index funds are generally less likely to decline in value

Which of the following best explains why many municipal bonds pay lower yields than other government bonds?

- 1) Municipal bonds are lower risk
- 2) There is a greater demand for municipal bonds
- 3) Municipal bonds can be tax-free

You invest \$500 to buy \$1,000 worth of stock on margin. The value of the stock drops by 50%. You sell it. Approximately how much of your original \$500 investment are you left with in the end?

- 1) \$500
- 2) \$250
- 3) \$0

Which is the best definition of "selling short?"

- 1) Selling shares of a stock shortly after buying it
- 2) Selling shares of a stock before it has reached its peak
- 3) Selling shares of a stock at a loss
- 4) Selling borrowed shares of a stock

Information Source

Which of the following information sources do you use when making an investment decision?

Stockbrokers

- 1) Yes
- 2) No

Financial advisors other than stockbrokers

- 1) Yes
- 2) No

Risk tolerance:

Which of the following statements comes closest to describing the amount of financial risk that you are willing to take when you save or make investments?

- 1) Take substantial financial risks expecting to earn substantial returns
- 2) Take above average financial risks expecting to earn above average returns
- 3) Take average financial risks expecting to earn average returns
- 4) Not willing to take any financial risks