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Financial Literacy and portfolio diversification: Evidence from Vietnam

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Abstract
This study investigates the relationship between the level of financial knowledge and portfolio diversification in Vietnam, an emerging financial market in Asia. To achieve this objective, we conducted an online survey of 343 investors actively participating in Vietnam's financial markets in 2020. The survey's primary goal was to assess both basic and advanced knowledge levels among investors in the field of finance, as well as their foundational grasp of economics. To gauge the extent of portfolio diversification among these investors, we included questions pertaining to the number of stocks and financial assets comprising their portfolios. The results of ordinary least squares and Probit regressions reveal a significant correlation between investors' financial knowledge and the extent of their portfolio diversification in Vietnam. Notably, comprehension of concepts such as the time value of money within digital currencies, financial assets, and risk measurement emerges as a pivotal factor influencing portfolio diversification levels. However, there is no significant relationship found between knowledge of economics and portfolio diversification. Furthermore, investors' personal circumstances, including their job positions and income, can also exert an influence on the degree of portfolio diversification they undertake. These findings underscore the importance of enhancing investors' understanding of financial products, as doing so can bolster competitiveness and serve as an effective means of enhancing the efficiency of Vietnam's financial markets. In light of these results, investors and policymakers should consider implementing measures aimed at adapting to market requirements, thereby fostering sustainable development.

***Keywords**:* Financial literacy; financial assets; stock markets; asset allocation; portfolio diversification

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1. INTRODUCTION

The stock market serves as a vital economic and financial instrument (Fung & Tsai, 2015). This significance is mirrored in Vietnam, an emerging economy boasting a relatively youthful stock exchange when compared to global stock market history. Established in 1998 in Ho Chi Minh, the market expanded to Hanoi, Vietnam's capital, in 2005. The evolution of this stock market has hinged on several factors, with one of the pivotal elements being the financial literacy of its participants. Most investors in Vietnam are individual and household investors who possess limited financial literacy (Iwaisako, 2009).

On the macroeconomic front, policies have been devised to encourage investor participation in the market. These policies aim to cater to investors' diversification needs by developing a variety of financial products.

On the microeconomic front, businesses are actively disseminating more information through media channels in an effort to attract investors. However, given these prevailing

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dynamics, achieving market efficiency in Vietnam has proven to be a formidable challenge (Vo & Truong, 2018). Consequently, the financial knowledge of market participants, particularly individual investors and households, assumes a critical role in facilitating the efficient utilization of financial markets for the benefit of the economy (Arts, 2018).

Investors possessing strong economic and financial literacy are more likely to comprehend the intricacies of the financial market and tend to make more judicious decisions. When a majority of investors attain such a level of understanding, it contributes to greater stability in market development (Ye & Kulathunga, 2019). In support of this notion, Van Rooij et al. (2011) have identified a positive correlation between investors' financial literacy and their aptitude for participating effectively in financial markets. Furthermore, familiarity with public financial information and product knowledge plays a pivotal role in enhancing one's capacity to engage in financial markets.

Conversely, a deficiency in knowledge often results in restricted portfolio diversification and elevated risk (Hilgert et al., 2003). Additionally, Zou and Deng (2019) have demonstrated that, due to a lack of knowledge, retail investors tend to make investment decisions by blindly following prevailing trends, a phenomenon commonly referred to as herding behavior (Hilgert et al., 2003; Urbancova, 2013). Furthermore, competition thrives among investors who possess a greater degree of knowledge and capital (Ozoguz & Rebello, 2013).

Assessing investors' financial literacy entails evaluating their grasp of fundamental economic concepts, including but not limited to growth, inflation, and exchange rates. As emphasized by Van Rooij et al. (2011), this assessment also necessitates evaluating their capacity to comprehend interest rates, profitability, simple interest, and compound interest. Additionally, it is crucial to consider factors such as their level of education, occupation, and job position. In today's modern economy, a sound understanding of financial products confers a competitive advantage in the stock market. Therefore, a comprehensive assessment of financial literacy should encompass emerging financial products featuring monetary elements, as well as investment instruments like Bitcoin or derivative products (Hsiao & Tsai, 2018; Nwaiwu, 2018).

In this context, our study's primary objective is to evaluate the level of financial literacy among participants in Vietnam's financial markets and establish connections between financial literacy, investment choices, and portfolio diversification. This study holds significance because Vietnam's stock exchanges are relatively young, and the knowledge level of investors can wield a substantial influence on their effectiveness. To fulfill this research objective, we conducted an online survey involving 343 participants in the Vietnamese financial markets.

In addition to gathering information through five questions related to the personal circumstances of the interviewees, such as their occupation and income, the questionnaire consisted of three questions designed to assess their economic knowledge and seventeen questions aimed at evaluating their financial knowledge, encompassing both basic and advanced concepts. Furthermore, we incorporated two variables to gauge the investment choices made by the interviewees and the extent of portfolio diversification. The first variable focused on the presence of stocks, while the second variable measured the inclusion of more than two assets in their investment portfolio. These three variables subsequently served as dependent variables in Probit and ordinary least squares (OLS) regression analyses, allowing us to discern the relationship between financial literacy and the investment decisions of Vietnamese investors.

Our empirical findings reveal a counterintuitive outcome: a higher level of financial knowledge among Vietnamese investors is associated with less diversified portfolios. This observation suggests a strong inclination among Vietnamese investors toward stocks, and greater financial literacy amplifies this preference. Moreover, our research indicates that a sound understanding of financial products is conducive to enhancing asset allocation, as it exhibits a positive correlation with investments in financial instruments beyond stocks.

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Additionally, our study underscores the pivotal role of investors' personal circumstances, with income and gender playing particularly significant roles in influencing their investment decisions. These findings imply that the Vietnamese government should consider expanding its efforts in financial education to provide investors with comprehensive information about financial markets and products. Such initiatives would empower investors to make well-informed investment decisions and contribute to the enhanced efficiency of financial markets in supporting the country's economic development.

The remainder of this paper is structured as follows. In the second section, we provide a comprehensive literature review on financial literacy and its impact on investors' decision-making processes. Section 3 is dedicated to discussing the data sample and outlining the methodology framework employed in our study. Section 4 offers an in-depth presentation of our research results, accompanied by a robustness check. Finally, in Section 5, we conclude the paper with a particular emphasis on the implications of our findings.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESES

In the initial subsection, our emphasis will be on the literature review concerning financial literacy and its correlation with investment decisions. In the subsequent subsection, we will articulate research hypotheses within the framework of the Vietnamese financial markets.

2.1. Financial Literacy and investment decisions

Previous studies have demonstrated a clear association between financial literacy and various financial decisions, including savings and investments in assets such as gold, foreign currencies, bonds, and stocks. These studies have also revealed that the majority of individuals maintain savings accounts (Lusardi & Mitchell, 2008; Hogarth & Hilgert, 2002), regardless of their level of financial literacy. Bernheim et al. (1998) pointed out that individuals with savings accounts and limited financial knowledge exhibit a reduced willingness to explore other types of financial assets. Additionally, Bernheim et al. (2001) and Berheim and Garrett (2003) identified a positive relationship between higher levels of financial education and a greater propensity to save money. Likewise, Lusardi and Mitchell (2011) and Hilgert et al. (2003) demonstrated that individuals with lower financial literacy are less inclined to plan for retirement, resulting in significantly lower wealth accumulation. Furthermore, Stango and Zinman (2009) found that individuals who cannot accurately calculate the interest payable at the end of a loan tend to accumulate less wealth. Dell'Ariccia and Pence (2009) argued that both young and older adults frequently make financial errors when they have limited financial resources. Conversely, Calvet et al. (2009) established that individuals with lower income and education levels typically possess lower financial literacy, making them more susceptible to making erroneous financial decisions, ultimately diminishing their financial competitiveness.

For contemporary and intricate financial instruments, such as derivatives or digital currency, Hsiao and Tsai (2018) discovered that enhanced financial knowledge aids investors in mitigating challenges associated with investment decisions. Li et al. (2020) have indicated that financial literacy leads to increased investment returns, particularly for younger and more educated households. Noviarini et al. (2021) observed that the relationships between financial literacy and risk tolerance, as well as financial literacy and debt anxiety, exhibit complexity and variability across different subgroups. Niu et al. (2020) provided evidence of a robust and positive impact of financial literacy on retirement preparedness levels in China. In their examination of the life insurance market in China, Wang et al. (2021) identified a positive correlation between financial literacy and the likelihood of holding life insurance. According to Jappelli and Padula (2013) and Beckmann (2013), the ability to accumulate wealth and save money is contingent upon one's financial literacy.

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Based on these findings, we have created Figure 1, depicting the relationship between financial literacy and investment decisions.

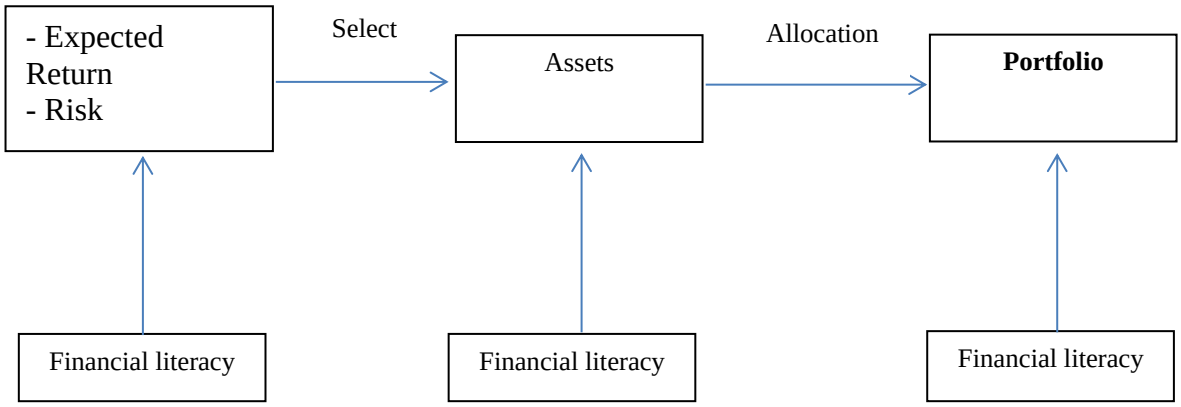

Figure 1. The link between financial literacy and investment decisions. Source: own research.

Figure 1 depicts that financial literacy can be gauged through three criteria: the assessment of risk versus return, comprehension of financial assets, and proficiency in asset allocation and portfolio management. An individual's grasp of the risk/return trade-off can significantly influence their understanding of financial assets, which, in turn, impacts their approach to asset allocation and ultimately shapes the characteristics of their investment portfolio.

Consistent with this assertion, Butler et al. (2014) discovered that a limited number of investors possess knowledge about portfolios, particularly in terms of measuring portfolio risk and return. According to Abreu and Mendes (2010), investors with a more profound comprehension of portfolio management tend to assume lower risks in their investment strategies. Furthermore, Mouna and Jarboui (2015) demonstrated that, in emerging markets, the majority of investors exhibit a limited understanding of the risk attributes associated with their portfolios and tend to make investment choices that lack rationality.

More recently, Fong et al. (2021) identified that while most older investors have a grasp of concepts like interest compounding and inflation, only half of them are familiar with the principles of risk diversification. Moreover, as per Atkinson and Messy (2012), individuals possessing a higher degree of financial literacy generally exhibit more efficient investment practices in comparison to those with lower financial acumen. Gärling et al. (2009) conducted a study suggesting that herding behavior tends to manifest in economies where the majority of investors have limited financial literacy. Additionally, Sivaramakrishnan et al. (2017) demonstrated that an elevated level of financial literacy contributes to the smoother functioning of financial markets.

In addition to considering return rates, it is crucial for investors to grasp the nature of risk, as emphasized by Ghysels et al. (2005). When investors possess a clear understanding of what constitutes risk, they are better equipped to gauge, categorize, and manage it effectively. Recognizing that each asset class carries a distinct level of risk enables investors to make more precise and informed investment choices, as highlighted by Aren and Zengin (2016).

In this context, Dorn and Huberman (2010) identified that, in many instances, investors have a conceptual understanding of risk but lack the practical knowledge required for its measurement. Consequently, this deficiency in understanding risk metrics often leads investors to opt for assets in a habitual or traditional manner. In a fiercely competitive market, investors well-versed in financial risk are capable of adapting their behavior more swiftly and, consequently, are better positioned to mitigate risk compared to their counterparts, as demonstrated by Haddad et al. (2021).

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Regarding the connection between financial literacy and asset allocation, Beckmann (2013) identified that most small investors possess a limited understanding of financial asset classes. Moreover, Beckmann (2013) demonstrated that individual investors are more acquainted with traditional investment avenues such as acquiring gold, depositing money in banks, or engaging in gambling. However, they often remain unaware of the diverse array of financial assets encompassed within the broader financial market, including stocks, bonds, and derivatives.

As noted by Jappelli and Padula (2013), familiarity with various asset types equips investors with the tools to better manage and mitigate risk. Furthermore, studies by Aren & Aydemir (2015), Abdeldayem (2016), and Fong et al. (2021) have collectively concluded that the level of financial literacy among individual investors significantly influences their approach to different investment options. For example, financial illiteracy has been identified as a root cause of suboptimal financial practices (Robb & Woodyard, 2011) and an impediment to making well-informed financial decisions (Chen & Volpe, 1998).

2.2. Formulated research hypotheses: financial literacy

Given the preceding understanding of the connection between financial literacy and investment choices, as well as the backdrop of recent financial market developments in Vietnam, our research examines the following hypotheses.
Hypothesis 1: Investors in Vietnam have a low level of financial literacy.
Hypothesis 2: A higher level of financial literacy in Vietnam would lead to a smaller proportion of investment in stocks and a more diversified portfolio.
Hypothesis 3: Investors' personal situation influences their investment portfolios.

Hypothesis 1 is formulated based on the literature presented above (e.g., Iwaisako, 2009), which suggests that investors in emerging markets, such as Vietnam, typically exhibit a lower level of financial literacy compared to those in developed markets.

In regard to Hypothesis 2, given that stocks are the most favored financial asset in Vietnam (e.g., Vo & Truong, 2018), participants often concentrate their investments solely on this asset class. In this context, we posit that investors with a higher level of financial literacy and, consequently, greater knowledge of various financial asset classes are more inclined to diversify their portfolios effectively, resulting in a lower allocation to stocks.

Regarding Hypothesis 3, we draw from prior studies (e.g., Mouna & Jarboui, 2015; Pak & Babiarz, 2018) to propose that personal factors such as age, gender, family status, income, and job position play a significant role in influencing investment decisions.

To gauge the extent of financial literacy, we administered an online survey to 343 validated participants. To assess the degree of portfolio diversification, our questionnaire encompassed inquiries regarding the number of assets within the portfolio and the inclusion of stocks therein. Further elaboration on our data collection methodology is provided in the subsequent section.

3. DATA SAMPLE AND METHODOLOGY FRAMEWORK

Our research methodology integrates both qualitative and quantitative approaches to assess the three formulated hypotheses. In our qualitative method, we gathered primary data through an online survey conducted in 2020 with participants from the Ho Chi Minh City Stock Exchange. We obtained responses from a total of 343 individual investors. The survey consisted of 28 questions, categorized as follows: three questions pertaining to participants' understanding of economics; five questions assessing participants' basic knowledge of finance; twelve questions evaluating participants' advanced knowledge of finance; five questions addressing participants' personal circumstances; and three questions concerning participants' asset allocation and portfolio diversification.

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For data analysis, we transformed the responses into numerical values by assigning scale values to each answer. Once this data transformation was completed, we employed quantitative techniques to test our three hypotheses. Specifically, we utilized Probit regression, where the dependent variable is a binary dummy variable associated with the inclusion of stocks in the portfolio and the inclusion of more than two assets in the portfolio.

For a comprehensive understanding of the data collection and model estimation, the first subsection delves into the data collection process, while the second subsection is dedicated to the empirical methodology employed.

3.1. Data collection and variables' measure

The data was collected through an online survey targeting investors active in Vietnam's financial markets. This survey was administered using Google Forms, with participation open to individuals who held at least one form of financial market investment, such as term deposits, gold investments, foreign currencies, bonds, stocks, or other financial assets. The primary aim of the questionnaire was to gauge the participants' levels of financial literacy. Additionally, it sought to assess portfolio diversification by examining investors' decisions to include stocks in their portfolios and their intentions to hold more than two different assets. To achieve these objectives, the questionnaire was structured into two distinct parts. Part 1 gathered general participant information, including gender, age, educational background, marital status, occupation, job position, and income.

Conversely, in part 2, our focus is on how financial knowledge influences investment decisions. We differentiate between basic and advanced levels of financial literacy through specific questions. To evaluate respondents' basic financial literacy, we include questions designed to gauge their comprehension of concepts such as simple interest, compound interest, inflation, and the time value of money. These questions were adapted from those utilized by Van Rooij et al. (2011), with adjustments made to align them with the characteristics of the Vietnamese stock market. This set of questions is aimed at assessing the participants' grasp of fundamental principles in economics and finance. Table 1 provides a sample of three questions designed to assess basic knowledge in economics, while Table 2 focuses on the five questions tailored to assess basic knowledge in finance.

Table 1. Questions on economics knowledge. Source: own research.

Question	Identified	Contents	Answer
B1. Self-assessment	*ECONOMIC*	*How would you assess your understanding of economics?*	*1 (low) to 7 (high)*
B2. Education level in economics	*ECONOMIC-D*	*What is the part of your education devoted to economics?*	• *Big* • *Medium* • *Small* • *None* • *Do not know* • *No answer*
B3. Daily use of knowledge in economics	*FINANCE-A*	*What is the part of economics knowledge used in your daily activities (job, hobbies, etc.)?*	• *Big* • *Medium* • *Small* • *None* • *Do not know* • *No answer*

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Table 2. Questions on basic financial knowledge. Source: own research.

Questions	Variables	Contents	Answer
C1. Numeracy	*FINANCE-B1*	*Assume you had VND100 million in your account and the interest rate was 5% per year. After 5 years, how much would you have in the account?*	• *More than VND105 million* • *Exactly VND105 million* • *Less than VND105 million* • *Do not know*
C1. Compound interest	*FINANCE-B2*	*Assume you had VND100 million in your account and the interest rate was 20% per year and you never withdraw money or interest payments. After 5 years, how much would you have on this account in total?*	• *More than* VND200 million • *Exactly* VND200 million • *Less than* VND200 million • *Do not know*
C3. Inflation	*FINANCE-B3*	*Assume that the interest rate on your savings account was 1% per year and the inflation rate was 2% per year. After 1 year, how much would you be able to buy with the money in this account?*	• *More than today* • *The same* • *Less than today* • *Do not know*
C4. Time value of money	*FINANCE-B4*	*Assume a friend inherits VND10,000 today, and his brother inherits VND10,000 in 3 years. Who will be richer thanks to the inheritance?*	• *The friend* • *His sibling* • *They are equally rich.* • *Do not know*
C5. Money illusion	*FINANCE-B5*	*Suppose that in 2019, your income doubled while prices of all goods also doubled. In 2019, how is the quantity of goods that you should be able to buy with your income?*	• *More than today* • *The same* • *Less than today* • *Do not know*

For each response, we assign a numerical value, with a higher value being allocated for answers that closely align with the correct response. The same approach is applied to questions pertaining to advanced knowledge in finance (Table 3). This series of questions aims to gauge a more advanced level of financial knowledge, encompassing topics such as inflation, simple interest, compound interest, rate of return, risk, risk/return trade-offs, and investment portfolios. Participants are required to select a single correct answer for each question.

Table 3. Questions about advanced financial knowledge. Source: own research.

Questions	*Variables*	*Answer*
D1. Which of the following statements describes the main function of a stock exchange?	*FINANCE-A1*	*- The stock exchange helps estimate stock earnings.* *- The stock exchange makes stock prices increase.* *- The stock exchange brings people who want to buy stocks together with those who want to sell stocks.* *- None of the above.* *- Do not know.*
D2. Which of the following statements is correct? *If a person buys stocks of firm B:*	*FINANCE-A2*	*- He/She owns a part of firm B.* *- He/She lends money to firm B.* *- He/She is liable for firm B's debts.* *- None of the above.* *- Do not know.*
D3. Which of the following statement is correct? *If a person buys bonds of firm B:*	*FINANCE-A3*	*- He/She owns a part of firm B.* *- He/She lends money to firm B.* *- He/she is liable for firm B's debts.* *- None of the above.*

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		- Do not know.
D4. Considering a long investment period (for example 10 years or 20 years), which asset would provide the highest return?	*FINANCE-A4*	*- Savings accounts.* *- Bonds.* *- Stocks.* *- Do not know.*
D5. In normal conditions, which asset has the highest fluctuations over time?	*FINANCE-A5*	*- Savings accounts.* *- Bonds.* *- Stocks.* *- Do not know.*
D6. When we invest money in different assets, does the risk of loss:	*FINANCE-A6*	*- increase?* *- decrease?* *- stay the same?* *- Do not know.*
D7. Stocks are considered to be riskier than bonds?	*FINANCE-A7*	*- True.* *- False.* *- Do not know.*
D8. Buying a stock of a company usually provides a safer return than buying a stock of mutual funds. True or false?	*FINANCE-A8*	*- True.* *- False.* *- Do not know.*
D9. If the interest rate falls, what should happen to bond prices?	*FINANCE-A9*	*- Rise.* *- Fall.* *- Stay the same.* *- Do not know.*
D10. Besides bonds and stocks, do you know any other financial assets?	*FINANCE-A10*	*- Gold, currencies.* *- Digital money.* *- Derivative products.* *- Real estate and other assets.* *- Do not know.*
D11. If you invest more in digital money, you will get?	*FINANCE-A11*	*- Higher return, lower risk.* *- Lower return, higher risk.* *- Higher return, higher risk.* *- Diversified portfolio.* *- Do not know.*
D12. To you, what is the most important source of advice when you must make important financial decisions for your family?	*FINANCE-F*	*- Parents, friends, or acquaintances.* *- Information from the newspapers.* *- Financial magazines, guides, books.* *- Brochures from my bank or mortgage adviser* *- Advertisements on TV, in newspapers, or other media* *- Professional financial advisers* *- Financial computer programs* *- Financial information on the Internet* *- Other*

In addition to the questions aimed at evaluating financial literacy levels, we incorporated inquiries to assess participants' portfolio diversification levels. These questions were designed with the objective of generating three variables for quantifying the extent of portfolio diversification among participants, labeled as STOCK, STOCK-N, and PORTFOLIO (Table 4). The variable STOCK takes on a value of 1 if the portfolio includes at least one stock and 0 if it does not. Variable STOCK-N represents the count of stocks held within the portfolio. Lastly, PORTFOLIO assumes a value of 1 when the portfolio comprises various types of financial assets in addition to stocks; otherwise, it is coded as 0.

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Table 4. Questions about portfolio diversification. Source: own research.

Questions	*Variables*	*Answer*
A1. What types of assets are there in your investment portfolio?	*STOCK* *STOCK-N*	☐ *Stocks;* ☐ *Bonds;* ☐ *Fund certificates;* ☐ *Deposits;* ☐ *Currencies;* ☐ *Gold;* ☐ *Cryptocurrencies* (such as Bitcoin, etc.) ☐ *Other*
A2. How many types of assets are there in your stock portfolio?	PORTFOLIO	☐ 1; ☐ 2; ☐ 3; ☐ 4; ☐ 5; ☐ 6; ☐ More than 7 • *Other numbers* • *Do not know* • *No answer*

The questions outlined in Tables 1, 2, 3, and 4 were administered through Google Forms and distributed to numerous investors in Vietnam's financial markets. Participation in the survey was restricted to individuals with at least one investment in the financial market, including term deposits, investments in gold, foreign currencies, bonds, stocks, or other financial assets. Subsequent to data cleansing, which involved the removal of incomplete questionnaires and unverified responses, our final dataset comprises the responses provided by 343 investors to our questionnaire.

To facilitate the application of quantitative methods, we transformed these responses into numerical values. The numerical values were assigned based on proximity to the correct answer, with higher values indicating closer alignment. The subsequent subsection will detail the quantitative methodology employed in our dataset analysis.

3.2. The estimated model

After the collection of all primary data, numerical values are assigned to participants' responses. We employ a Probit model to explore the relationship between the level of financial literacy and the diversification of participants' portfolios, as outlined by Christiansen et al. (2008). With this objective, we consider that investors *i* must select or reject a given portfolio. Therefore, Y_i can be equal to 1 if investor *i* chooses this portfolio and 0 otherwise. Moreover, its value is determined by a latent variable Y_i^*, meaning when $Y_i^* \geq 0$, variable $Y_i = 1$; and when $Y_i^* < 0$, variable $Y_i = 0$. Therefore, the latent variable Y_i^* is regressed on financial literacy (*Financial_literacy_i*) and control variables X_i. The Probit model to be estimated is as follows:

$$Y_i = 1 \; if \; Y_i^* \geq 0$$

$$Y_i = \beta_0 + \alpha_i Financial\_Literacy_i + \beta_i Control\_Variables_i + \varepsilon_i \quad (1)$$

with:

$$P(Y = 1 \; \therefore Literacy_i, Control\ variables) = \Phi\ (\beta_0 + \alpha_i Literacy_i + \beta_i Control\_Variables_i) \quad (2)$$

Equation (2) illustrates the Probit model with multiple regressors, incorporating variables encompassing financial literacy and a range of control variables. Here, $\Phi(.)$ is the cumulative standard normal distribution function. The financial literacy variables pertain to both fundamental and advanced financial knowledge, as documented in Tables 1, 2, and 3. The control variables encompass inquiries about investors' personal circumstances, encompassing gender, age, marital status, educational background, occupation, position, and income. Further elaboration on these variables can be found in subsection 3.1.

In light of the Probit model definition provided above, we proceed to present the comprehensive regressions involving the variables outlined in Tables 1, 2, 3, and 4 as follows: Considering the above definition of the Probit model to be estimated, the detailed regressions with variables defined in Tables 1, 2, 3, and 4 are as follows:

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$$Portfolio_i = \beta_0 + \alpha_1 Economics_i + \alpha_2 Basic\_Finance_i + \alpha_3 Advanced\_Finance_i + \beta_1 Personal\_Situation_i + \varepsilon_i \quad (3)$$

$$Stock_i = \beta_0 + \alpha_1 Economics_i + \alpha_2 Basic\_Finance_i + \alpha_3 Advanced\_Finance_i + \beta_1 Personal\_Situation_i + \varepsilon_i \quad (4)$$

$$Stock - N_i = \beta_0 + \alpha_1 Economics_i + \alpha_2 Basic\_Finance_i + \alpha_3 Advanced\_Finance_i + \beta_1 Personal\_Situation_i + \varepsilon_i \quad (5)$$

With: $Portfolio_i$, $Stock_i$ and $Stock - N_i$ are defined in Table 4. These variables measure the level of portfolio diversification (the types of assets in the portfolio), the inclusion of assets other than stocks in the portfolio, and the number of stocks in the portfolio, respectively.

$Economics_i$ includes the variables related to the questions on basic economics knowledge (Table 1), which are *ECONOMIC*, *ECONOMIC-D*, and *ECONOMIC-A*.

$Basic\_Finance_i$ includes the variables related to the questions on basic knowledge in finance (Table 2), which are *FINANCE-B1* to *FINANCE-B5*.

$Advanced\_Finance_i$ includes the variables related to the questions on advanced knowledge in finance (Table 3), which are *FINANCE-A1* to *FINANCE-A11*, and *FINANCE-F*.

$Personal\_Situation_i$ includes the variables related to the questions on the personal situation of the participants about their gender, age, marriage statute, job, job position, education, and income.

For the estimation of equations (3), (4), and (5), we employ the binary Probit model for the dummy variable STOCK, as detailed by Fong et al. (2021), and OLS estimation for the continuous variables PORTFOLIO and STOCK-N, as described by Van Rooij et al. (2011). Section 4 will showcase the outcomes of our research.

4. EMPIRICAL RESULTS

In this section, our objective is to test the three formulated hypotheses presented in Section 2 by utilizing empirical results obtained through the estimation of equations (3), (4), and (5), as detailed in Section 3. Prior to that, Subsection 4.1 provides an overview of the main characteristics of our data sample with respect to the personal situation of participants. Subsection 4.2 delves into the sample's composition in terms of the surveyed investors' levels of knowledge in economics and finance.

4.1. Description of the sample – Personal situation of participants

To evaluate our survey of 343 investors, we conducted an analysis using the data collected for the control variables, namely *Gender*, *Age*, *Marital Status*, *Education*, *Occupation*, *Job Position*, and *Income*. The findings are displayed in Table 5 and Figure 2.

Table 5. Descriptive statistics of the sample. Source: own research.

Gen		**Age**		**Job**	
Male	59%	21-30	58 %	Finance, banking, insurance	36%
Female	41%	31-40	28 %	Business administration, marketing, human resources	13%
Married		41-50	11 %	Accounting, auditor	10%
Married	55%	51-60	2%	Mechanical Engineer	1%
Single	45%	>60	1%	Construction engineer	1%
Education		**Job position**		Transport business professionals, tourism	1%

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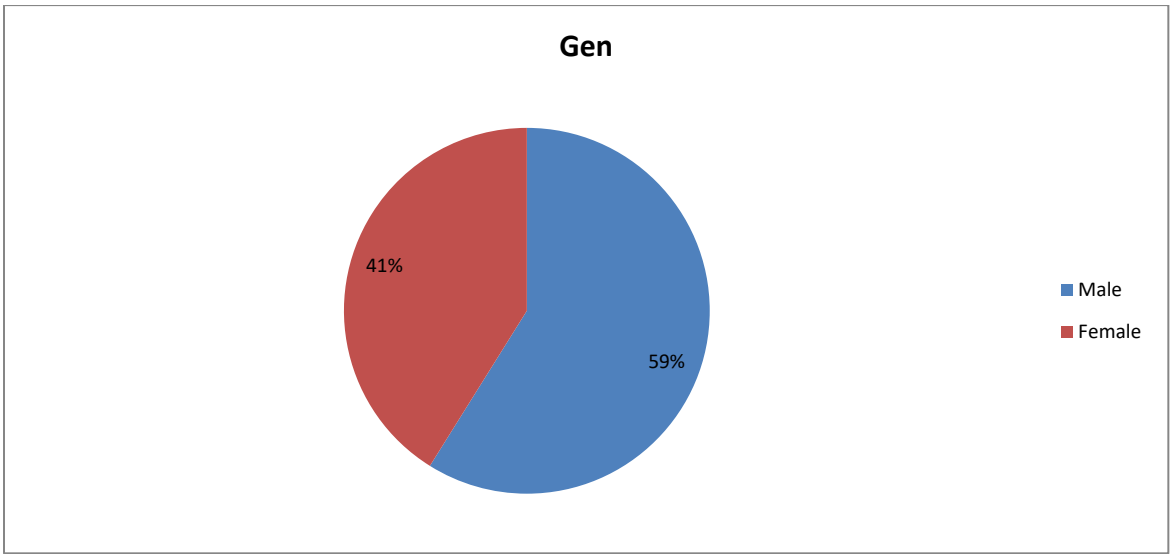
Primary school	0.3%	Staff	32 %	Engineer of irrigation and environment	1%
Preparatory intermediate vocational	1.2%	Expert	29 %	Electrical engineering and electronics	1%
Intermediat e vocational	4.4%	Chef/Manager/Head of Department	16 %	Information technology engineer, software	1%
University	66.8 %	Director	3%	Teachers, lecturers	12%
Over University	27.4 %	Self- Employed	4%	Singers, musicians...	0%
		Pension	1%	Actors, directors...	0%
		Other	15 %	Other	21%
Income (VND)					
9.010.000-14.000.000	61%	14.010.000-19.000.000	14 %	19.010.000- 27.000.000	10%
27.010.000-41.000.000	8%	41.010.000-61.000.000	2%	61.010.000-89.000.000	2%
> 89.000.000	3%				

We surveyed 343 investors, with 59% being male and 41% female. This outcome indicates a greater interest in financial investment among men. Furthermore, individuals in the 21–30 years old group represent the largest segment of stock market participants (58%), followed by those in the 31–40 years old bracket (28%) and 11% in the 41–50 years old group. Consequently, 97% of the surveyed investors fall within the 21–50 age range, suggesting a higher likelihood of stock market investment among younger individuals.

In terms of education levels, the survey findings reveal that most investors hold a university degree (68%), with 27.4% of participants possessing education beyond the university level. This observation underscores the greater propensity of individuals with higher educational attainment to engage in stock market activities (Arts, 2018). Additionally, a slightly higher proportion of single individuals participate in the financial market compared to their married counterparts (55.4% vs. 44.6%). This outcome implies that young, unmarried individuals, particularly recent graduates, exhibit a greater inclination toward investing in stock markets.



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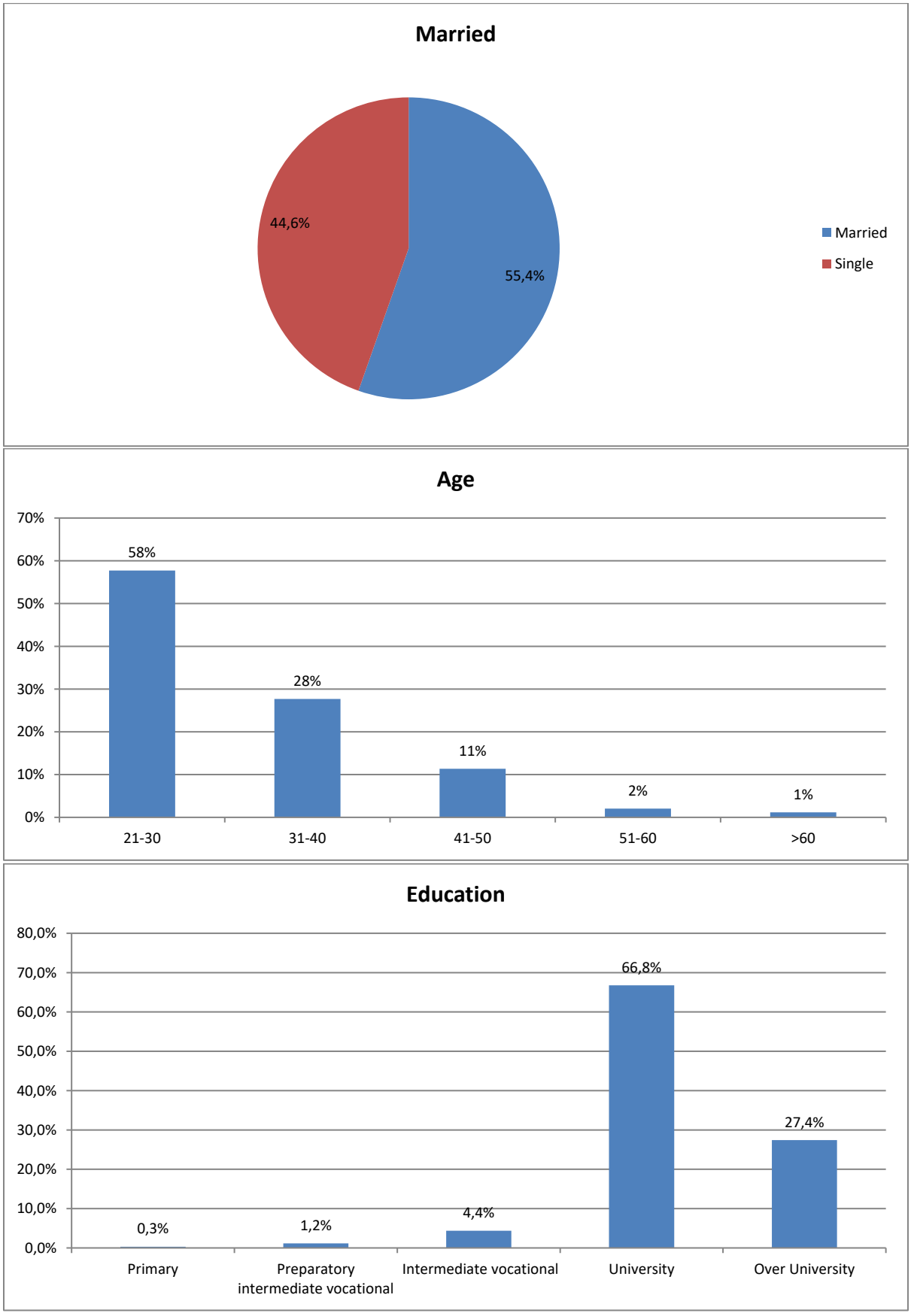

Figure 2. Description of the sample. Source: own research.

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Regarding employment and job positions, the results indicate that investors come from diverse industries, with a significant portion working in the finance sector, specifically 35.6% in finance, 13.1% in business, and 10.2% in accounting. This finding suggests that individuals employed in the finance sector in Vietnam display a higher propensity for investing in stock exchanges. Furthermore, most investors are employed (31.8%).

Income levels exhibit a close relationship with investment choices. Notably, 61.2% of stock market participants have a low income (under VND14 million), while those with incomes ranging from VND14.1 million to VND19 million constitute 14.3% of the sample. This outcome diverges from patterns observed in developed countries, where individuals with higher incomes or greater financial resources are more inclined to participate in financial markets (Mouna & Jarboui, 2015). In Vietnam, it appears that individuals with lower income levels are more actively involved in financial markets. This phenomenon could reduce competition among investors in the market, particularly in relation to foreign investors. Consequently, the results suggest that the majority of participants in the Vietnamese stock market are retail investors, contributing to a high number of participants with relatively low holdings of financial assets.

This sample description provides valuable insights into the profile of participants in Vietnam's financial markets. Generally, they are young individuals with a high level of education but with incomes typically falling within the low to medium range. A majority of them are employed in the finance sector. Notably, men exhibit a greater interest in financial market participation compared to women, and married individuals tend to be more inclined toward investing in stock exchanges than their single counterparts. In the upcoming subsection, we will delve into an analysis of the relationship between financial knowledge levels and portfolio diversification.

4.2. Description of the sample – The level of knowledge in economics and finance

In this subsection, we delineate our sample with respect to participants' proficiency in economics and finance, as evidenced by the questions provided in Tables 1, 2, and 3. Tables 6 and 7 exhibit the outcomes concerning economics knowledge and its practical application by the participants in their daily activities, whereas Tables 8 and 9 pertain to fundamental and advanced finance knowledge.

Table 6. Economics knowledge - Self-assessed literacy. Source: own research.

Score	*1 (low)*	*2*	*3*	*4*	*5*	*6*	*7(high)*
Numbers of participation	14	22	44	102	123	29	9
Portion of participation	4.1%	6.4%	12.8%	29.7%	35.9%	8.5%	2.6%

Note: This table reports the statistics obtained with question B1 in Table 1 about the self-assessment of participants on their level of knowledge in economics.

Table 6 reveals that 35.9% of participants rated their economics knowledge as a 5 out of 7, with 76.7% of participants having a rating higher than 4. Conversely, only 23.3% of participants perceived their economic knowledge as low, scoring below 4 points. Meanwhile, Table 7's results demonstrate that the majority of participants assessed their level of education in economics as medium (58.3%). Surprisingly, only 6.1% of participants believed they had received a high-level education in economics. Given that most respondents possess a university degree, this suggests a possible deficiency in economics education within Vietnamese universities. Furthermore, a substantial proportion of participants indicated that they apply only a moderate portion of their economics knowledge in their daily activities.

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Table 7. Knowledge in Economics – Contribution to daily activities. Source: own research

Answer	*Economics education*		*Daily use of economics knowledge*	
	N	%	*N*	%
Big	21	6.1%	49	14.3%
Medium	200	58.3%	214	62.4%
Small	82	23.9%	56	16.3%
None	25	7.3%	17	5.0%
Do not know	15	4.4%	6	1.7%
No answer	0	0.0%	1	0.3%

Note: This table reports the statistics obtained with questions B2 and B3 in Table 1 about the education level in economics and participants' daily use of knowledge in economics.

Regarding the level of knowledge in finance of participants, Table 8 presents the synthesis results.

Table 8. Basic financial literacy. Source: own research

	C1. Numeracy	C2. Compound interest	C3. Inflation	C4. Time value of money	C5. Money illusion
Correct	69.0%	86.6%	72.6%	54.5%	63.7%
Incorrect	27.2%	9.9%	17.5%	26.5%	27.2%
Do not know	3.8%	3.5%	9.9%	19.0%	9.1%

Note: This table shows the statistics for questions on basic knowledge in finance presented in Table 2. These are questions entitled C1, C2, C3, C4, and C5, in Table 2.

The results presented in Table 8, focusing on basic financial literacy, indicate that most participants answered the questions correctly, with correct answer rates exceeding 50% for most questions. Notably, the question concerning compounding garnered an impressive 86.6% correct response rate, underscoring a commendable level of knowledge regarding compounding in financial investment. Conversely, when assessing comprehension of the time value of money, only 54.5% provided correct answers, while 26.5% responded incorrectly. A notable portion of respondents (the remaining 18.9%) did not possess knowledge of the concept of the time value of money.

Despite financial literacy being of a basic nature, it is concerning to observe relatively high rates of incorrect answers, ranging from 9.9% as the lowest to 27.2% as the highest. This suggests that, despite participation in the financial market, some investors still struggle with grasping fundamental financial concepts.

In reference to advanced financial knowledge, Table 9 presents statistical data derived from the questions featured in Table 3.

Table 9. Advanced financial literacy. Source: own research

Advanced financial literacy	Correct	Incorrect	Do not know	Total
D1. Understanding the stock market	78.4%	12.5%	9.1%	100.0%
D2. Understanding the implication of stock ownership	76.1%	16.0%	7.9%	100.0%
D8. Understanding mutual funds	28.6%	34.4%	37.0%	100.0%
D9. Understanding bonds	69.1%	20.7%	10.2%	100.0%
D4. Understanding return rate of financial asset	39.9%	42.9%	17.2%	100.0%
D5. Understanding risk of financial asset	78.4%	12.8%	8.7%	100.0%
D6. Understanding risk of portfolio	78.1%	10.8%	11.1%	100.0%
D7. Understanding risk of different stock and bond	74.9%	14.0%	11.1%	100.0%
D8. Understanding risk of different stock and stock mutual fund	54.2%	16.3%	29.4%	100.0%

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D9. Understanding correlation between interest rate and bond price	33.2%	53.1%	13.7%	100.0%
D11. Understanding correlation between risk and return	76.7%	11.4%	12.0%	100.0%
D12. Understanding Bitcoin	33.2%	31.2%	35.6%	100.0%

Note: This table shows the statistics for questions on advanced knowledge in finance presented in Table 3. These are questions entitled D1 to D12 in Table 3.

Table 9 reveals that proficiency in advanced finance knowledge is not uniform across various finance topics. Specifically, when addressing common financial concepts like the stock market's function, stocks, bonds, risk and distinguishing between bonds and stocks, the correct response rates are 78.4%, 76.1%, 69.1%, 78.4%, and 74.9%, respectively. This suggests that most investors possess a solid grasp of knowledge pertaining to the stock market. However, it's noteworthy that, despite the majority answering correctly, a relatively high rate of approximately 30% still provided incorrect responses.

In contrast, when assessing knowledge regarding distinctions among different financial asset classes, only 39.9% of participants answered correctly. This outcome underscores a low level of advanced financial knowledge among participants in Vietnam. Additionally, it is evident that the correct answer rates are notably lower when questions pertain to financial assets other than stocks. For instance, concerning knowledge about mutual funds, only 28.6% of participants provided the correct answers.

Moreover, concerning the comprehension of the correlation between interest rates and bond prices, most participants responded incorrectly (51.3%). Notably, even individuals employed within the financial sector or those with a background in finance provided erroneous answers to this question. Comparable findings emerged in the inquiry regarding emerging financial assets, including cryptocurrencies and Bitcoin, with 31.2% of participants providing incorrect responses.

In summary, it is apparent that individuals engaged in the stock markets in Vietnam generally exhibit a commendable level of knowledge regarding stocks. However, their understanding of various other financial instruments, including bonds, mutual funds, and cryptocurrencies, remains limited. Furthermore, it is evident that their grasp of distinct financial principles, particularly those related to risk and return, is also constrained. Based on these statistics, we can infer that participants in Vietnam's financial markets tend to possess a more extensive knowledge of stocks compared to other financial products while concurrently holding a relatively modest level of comprehension regarding financial concepts and values.

This outcome thereby substantiates Hypothesis 1, which posits that Vietnamese participants in financial markets possess a low level of financial knowledge. This aligns with findings from prior research on emerging markets, as seen in studies by Mate and Dam (2018) and Sabir et al. (2019). The subsequent subsection will present the findings pertaining to the correlation between financial knowledge and portfolio diversification, enabling us to assess hypotheses 2 and 3, as formulated in Section 2.

4.3. Financial Literacy and portfolio diversification

In this subsection, we present the results of the relationship between financial literacy and the level of portfolio diversification among investors in Vietnamese financial markets. Before presenting the regression results, as defined in Section 3, it is important to analyze the main descriptive statistics of the three dependent variables: STOCK, STOCK-N, and PORTFOLIO.

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Table.10- Descriptive statistics of the dependent variables**.** Source: own research

Variable	Mean	Median	Maximum	Minimum	Std. Dev.
STOCK	0.5598	1	1	0	0.497
STOCK_N	2.4869	2	25	0	3.016
PORTFOLIO	2.0364	2	7	1	1.143

Table 10. Descriptive statistics of the dependent variables. Source: own research. Note: This table presents the main descriptive statistics of the three dependent variables in Table 4. STOCK is a binary dummy variable equal to 1 if there are other types of financial assets than stocks in the portfolio of participants. STOCK-N indicates the number of stocks which are in the portfolio of participants. PORTFOLIO indicates the number of types of assets in the portfolio of participants.

Table 10 reveals that the STOCK variable has an average value of 0.5598, indicating that more than 50% of participants in the survey have invested in stocks. Regarding the STOCK-N variable, the mean is 2.48, implying that, on average, each participant invests in approximately 2.5 different stocks. As for the PORTFOLIO variable, an average value of 2.036 suggests that participants typically hold 2 different financial assets in their portfolios.

These descriptive statistics shed light on the popularity of stocks as a financial asset in Vietnam, with almost 50% of participants choosing to invest in this category. However, participants tend to concentrate their investments in stocks from only a few companies, as the average number of stocks in their portfolios stands at 2.5. This finding suggests that investors in Vietnam have a preference for focusing their investments on a limited number of companies, indicating a less pronounced emphasis on diversification. Moreover, the analysis highlights that investors in Vietnam also tend to concentrate their investments on a select few types of financial products. This initial examination reveals that there is not a high level of portfolio diversification among the survey participants.

Table 11 presents the results derived from the estimation of equations (3), (4), and (5) to elucidate the connection between financial knowledge and investors' portfolio diversification levels. A preliminary examination of Table 11 reveals that the estimated models do not exhibit multicollinearity issues, as evidenced by the Durbin-Watson test statistics, which fail to reject the null hypothesis.

The initial section of Table 11 demonstrates that investors' personal circumstances can significantly influence their portfolio diversification. Among the dependent variables, the most notable coefficients are associated with STOCK, which assesses whether participants include financial assets other than stocks in their portfolios. Accordingly, the STOCK variable indicates investors' willingness to diversify their portfolios beyond stocks. Notably, Table 11 shows a positive estimated coefficient for gender, suggesting that men tend to invest more in assets other than stocks in Vietnamese financial markets compared to women. Additionally, the education variable also exhibits a positive estimated coefficient, indicating that individuals with higher levels of education are more inclined to invest in assets other than stocks. Similarly, the income variable displays a positive and significant coefficient, suggesting that higher incomes correspond to a greater propensity among participants to invest in assets other than stocks.

Conversely, the coefficients associated with marital status and job position are significantly negative. This implies that married individuals tend to invest more in stocks than in other types of assets. Furthermore, participants with higher job positions tend to allocate more of their investments to stocks rather than other financial assets. These findings corroborate Hypothesis 3, which posits that the personal circumstances of investors can influence their degree of portfolio diversification.

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Table 11. Financial literacy and financial asset portfolio. Source: own research

Variable	PORTFOLIO *(OLS)*	STOCK *(Binary Probit)*	STOCK-N *(OLS)*
GEN	-0.0430	0.3918**	0.6195*
AGE	-0.0101	-0.0124	-0.0213
EDUCATION	0.2578	0.9433**	0.4602
MARRID	-0.0717	-0.5034**	0.0989
JOB	-0.0474	0.3166*	-0.0345
POSITION	-0.2601***	-0.5508***	-1.0325***
LNINCOME	0.4119***	0.7941***	1.5213***
ECONOMIC	0.0722	-0.0171	0.1615
ECONOMIC_A	-0.0610	0.1912	0.3432
ECONOMIC_D	0.1273	0.1204	-0.1778
FINANCE_B1	-0.0124	0.2774	0.5442
FINANCE_B2	0.0828	-0.1874	-0.2393
FINANCE_B3	0.1083	0.1845	0.1329
FINANCE_B4	0.2076	0.4962***	0.6792**
FINANCE_B5	0.2220	0.4269**	0.8479**
FINANCE_A1	-0.1193	-0.0382	0.1375
FINANCE_A2	0.0502	0.2062	-0.0007
FINANCE_A3	0.0411	0.6772***	0.9032**
FINANCE_A4	-0.1113	0.2358	0.3146
FINANCE_A5	0.0480	0.6062**	0.8244*
FINANCE_A6	-0.0549	-0.4464*	-0.7227*
FINANCE_A7	-0.1778	-0.4014*	-0.4849
FINANCE_A8	0.1492	0.0023	0.3008
FINANCE_A9	0.0782	0.1789	0.3072
FINANCE_A10	0.1081	-0.3777	-0.4536
FINANCE_A11	0.1861***	0.2437**	0.1863
FINANCE_F	-0.0227	-0.1585**	-0.2632**
Constant	-5.3770**	-14.433***	-24.230***
Obs	*343*	*343*	*343*
R-squared	*0.1654*	*0.3076*	*0.2499*
F-statistic	*2.286461*	*6.86*	*3.888*
Durbin-Watson stat	*2.012*	*1.758*	*1.818*

Note: This table presents the results of the estimation of equations (3), (4), and (5), presented in Section 3. The columns present the dependent variables. The lines present the independent variables. The first part of the variables is related to the personal situation of the participants. The second part of the variables is related to questions on economics knowledge. The third part of the variables is related to questions on basic knowledge in finance. The fourth part of the variables is related to questions on advanced knowledge in finance. The definition of the variables is presented in Tables 1, 2, 3, and 4. ***, **, * significant at 1%, 5%, and 10%, respectively.

Concerning the STOCK-N variable, participants' characteristics exhibit a significant relationship only with gender, job position, and income. As for the PORTFOLIO variable, the noteworthy coefficients are solely associated with job position and income. When considered in conjunction with the findings related to the STOCK variable, it becomes evident that investors' personal circumstances do not uniformly impact the type of assets or the quantity of stocks in their portfolios. Hence, it is imperative to differentiate between various aspects of portfolio diversification. In relation to the composition of assets within the portfolio (variable PORTFOLIO), it is observed that individuals with higher job positions tend to have a smaller number of distinct asset types in their portfolios.

Conversely, a higher income level corresponds to a greater inclination among participants to incorporate various types of financial assets into their portfolios. This finding implies that investors with higher incomes may feel more at ease investing in assets with which they are

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less familiar than stocks. However, when occupying a higher job position, they exhibit a reduced willingness to invest in financial assets other than stocks.

In relation to the level of knowledge in economics, the results presented in Table 11 indicate that none of the three variables under consideration exhibit a significant estimated coefficient. This finding suggests that the level of knowledge in economics does not significantly influence the degree of portfolio diversification among investors.

Turning our attention to the basic level of financial knowledge, as shown in Part 3 of Table 11, none of the related variables display a significant coefficient in relation to the dependent variable PORTFOLIO. This outcome implies that a fundamental understanding of finance does not play a role in investors' decisions to diversify their portfolios across various types of financial assets. This finding aligns with Hypothesis 1 and is consistent with the results reported by Iwaisako (2009).

However, when considering the level of basic knowledge in finance related to questions B4 (time value of money) and B5 (money illusion) (Table 2), a significant and positive coefficient is observed with respect to the STOCK and STOCK-N dependent variables. This observation indicates that comprehending the concept of the time value of money can motivate investors to further diversify their portfolios, either by investing in more stocks (STOCK-N) or by allocating their investments to financial assets other than stocks. A similar pattern emerges when examining the level of knowledge regarding money illusion, which entails understanding the impact of inflation on purchasing power. This result implies that grasping the relationship between purchasing power, income, and inflation encourages investors to expand the diversification of their portfolios. Overall, these findings shed light on the nuanced role of knowledge in influencing investors' portfolio diversification decisions.

Turning to the level of advanced knowledge in finance, Part 4 of Table 11 reveals that only question A11, which pertains to digital money, exhibits a positive relationship with the PORTFOLIO variable, indicating an association between understanding digital currency and the extent of asset diversification within portfolios. In the context of the STOCK and STOCK-N variables, several other variables linked to advanced finance knowledge display significant coefficients. Specifically, questions A3 (difference between stocks and bonds), A5 (volatility risk), A6 (portfolio risk), A11 (digital money), and F (financial advice) are noteworthy. Among these variables, A3, A5, and A11 demonstrate positive coefficients, while A6 and F exhibit negative coefficients.

These findings suggest that investors who grasp the distinctions between stocks and bonds (A3), comprehend volatility risks (A5), and have knowledge of digital money (A11) tend to allocate their investments beyond stocks alone. This observation aligns with Hypothesis 2, which posits a relationship between financial literacy and diversification in investment. However, this effect primarily extends to diversifying within stocks. In contrast, a limited number of investors venture beyond stocks in diversifying their asset portfolios, except for those who possess knowledge about bonds, volatility risks, and digital money.

These results underscore the importance of understanding the differences among various financial asset classes in motivating investors to diversify their investment portfolios further. Additionally, comprehension of volatility risks associated with financial assets contributes to increased portfolio diversification. Conversely, an understanding of portfolio risk (A6) diminishes the extent of portfolio diversification among investors. It is crucial to note that question A6, "When we invest money in different assets, does the risk of loss increase? Decrease? Stay the same? Do not know," indicates that the closer the response aligns with the correct answer (decrease), the less diversified investors' portfolios tend to be (negative coefficient).

Lastly, question F (related to the source of financial advice) exhibits a negative coefficient with respect to the STOCK and STOCK-N variables. This finding implies that investors who seek guidance from financial professionals are more inclined to diversify their portfolios.

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In summary, the findings presented in Table 11 underscore the substantial influence of investors' personal circumstances on their portfolio diversification levels. This outcome substantiates Hypothesis 3 and is consistent with prior research (e.g., Mouna & Jarboui, 2015; Pak & Babiarz, 2018). Among these personal factors, job position and income emerge as the most significant determinants of portfolio diversification. Conversely, the study reveals that knowledge of economics does not exhibit a significant relationship with the extent of portfolio diversification among investors. However, a foundational understanding of finance, particularly with regard to concepts such as the time value of money and money illusion, appears to enhance investors' portfolio diversification. Furthermore, when it comes to advanced finance knowledge, familiarity with various financial asset classes plays a pivotal role in driving portfolio diversification, with a particular emphasis on digital assets. Notably, knowledge concerning volatility risk also contributes to improved portfolio diversification strategies.

4.4. Robustness check with another model specification

To assess the robustness of our findings presented in Table 11, we conducted additional estimations using equations (4) and (5). In these estimations, we focused exclusively on variables associated with investors' personal circumstances, along with a subset of variables pertaining to basic knowledge (questions B4 and B5) and advanced knowledge in finance (questions A3, A5, A6, A7, A11, and F).

Regarding question A11, which pertains to knowledge of cryptocurrency and Bitcoin, we segregated responses into two distinct subsamples. The first subsample corresponds to responses indicating "Higher return, lower risk", while the second subsample pertains to responses indicating "Diversified portfolio." Question A11 inquires, "If you invest more in digital money, you will get:". The outcomes of this robustness examination are presented in Table 12.

Table.12- Robustness check – with STOCK and STOCK-N variables. Source: own research

Variables	STOCK *(Binary Probit)*	STOCK-N *(OLS)*
GEN	0.3756**	0.6142*
AGE	-0.0097	-0.0205
EDUCATION	0.9394**	0.4524
MARRID	-0.5237**	0.0942
JOB	0.3089*	-0.0398
POSITION	-0.5343***	-1.0281***
LNINCOME	0.7771**	1.5165***
FINANCE_B4	0.4596***	0.6709**
FINANCE_B5	0.4454**	0.8533**
FINANCE_A3	0.6865***	0.9044**
FINANCE_A5	0.5980**	0.8201*
FINANCE_A6	-0.4526*	-0.7225*
FINANCE_A7	-0.4081*	-0.4833
FINANCE_A11		
Answer 1 - High return, high risk	*0.516665****	*0.276149*
Answer 2 - Diversified portfolio	*0.415944**	*0.354591*
FINANCE_F	-0.153457**	-0.262171**
C	-14.32965	-24.19778***
Obs	*343*	*343*
R-squared	0.313	0.250
F-statistic	*6.53*	3.74
Durbin-Watson stat		1.82

Note: This table presents the estimated results for the stock variable according to the binary Probit method and the stock-N variable according to the OLS method. Knowledge about Bitcoin (FINANCE_A11) is grouped into two

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answer options “High return, high risk” and “Diversifiable portfolio”. ***, **, * significant 1%, 5% and 10%, respectively.

The purpose of this robustness check is to validate the primary findings presented in Table 11 regarding the influence of personal circumstances, basic financial knowledge (comprising the time value of money and money illusion, represented by questions B4 and B5), and advanced financial knowledge (comprising questions A3, A5, A6, A7, A11, and F).

In the case of question A11, we also consider the two most prevalent responses: “high return, high risk” and “diversified portfolio.” The outcomes in Table 12 corroborate the results obtained in Table 11, particularly in relation to all significant coefficients. Notably, an intriguing result in Table 12 pertains to the two responses to question A11 concerning advanced financial knowledge. Both groups of responses yield identical findings, signifying that whether participants perceive digital money as increasing both risk and return or view it as contributing to portfolio diversification, knowledge of digital money heightens the likelihood of investing in financial assets beyond stocks (as indicated by the dependent variable STOCK). However, this knowledge does not exhibit a significant relationship with the quantity of stocks included in portfolios.

5. CONCLUSION AND POLICY IMPLICATIONS

Our study investigated whether the financial literacy of market participants has an impact on their decisions regarding financial assets, the composition of their financial portfolios (including stocks), and their engagement in the Vietnamese financial market. The research findings hold significance in assisting investors in recognizing the constraints imposed by their financial literacy. These findings can serve as a basis for investors to strategize ways to enhance their financial literacy and thereby improve their competitiveness. Furthermore, securities market regulators and policymakers should contemplate the implementation of training programs for market participants. Additionally, they should explore the possibility of integrating fundamental financial knowledge into high school curricula.

The assumption here is that investors should possess at least a fundamental level of financial literacy. Furthermore, a higher level of financial literacy is imperative for participants involved in the financial market, particularly within the context of the stock market. Consequently, this paper has unearthed compelling evidence highlighting this issue within the burgeoning stock market of Vietnam.

The study is grounded in a randomized survey involving 343 participants within the financial markets. By utilizing the Binary Probit and OLS regression estimation methods, we aimed to ascertain the correlation between financial literacy and the composition of financial asset portfolios, including those containing stocks, as well as the variety of stock types within such portfolios. The study reveals that financial literacy does indeed influence the selection of stocks within asset portfolios and the quantity of stocks within stock portfolios. However, it is important to note that not all facets of financial knowledge exert the same impact. Consequently, the research has endeavored to discern the varying effects associated with different knowledge domains.

Certain dimensions of knowledge do not appear to influence asset selection. For instance, upon distinguishing between basic and advanced financial literacy, our analysis did not reveal a significant relationship between financial literacy and the selection of financial assets for the portfolio. Additionally, the study did not identify any correlation between general economic knowledge and the composition of asset portfolios, portfolios containing stocks, or the quantity of stocks within stock portfolios.

However, basic financial literacy exhibits a positive influence on the selection of portfolios that include stocks, and the quantity of stocks within those portfolios is linked to knowledge pertaining to the understanding of monetary value. In contrast, advanced financial literacy

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demonstrates variation with respect to its impact on different aspects of financial knowledge. A comprehension of bonds and the associated risks related to financial assets positively affects the composition of financial asset portfolios containing stocks and the number of stocks within those portfolios. Conversely, knowledge concerning portfolio risk and the risk distinctions among bonds, as well as bond-related risks, are associated with a reduced number of stocks in the portfolio. Solely possessing knowledge about portfolio risk has a detrimental effect on portfolio diversification, and familiarity with new financial assets such as Bitcoin only has a positive impact on stock portfolios. Additionally, financial literacy acquired from family members exerts a negative influence on both portfolios consisting of financial assets with stocks and the quantity of stocks within stock portfolios.

Furthermore, upon incorporating the control variables, the variable 'job position' exhibited a negative influence on all three dependent variables, whereas the 'income' variable demonstrated a positive impact across the board. Gender had a positive effect on the composition of financial asset portfolios containing stocks, as well as on the diversification of the stock portfolio in terms of the number of stock types. On the other hand, 'married' was found to have a negative effect solely on financial asset portfolios containing stocks, while 'occupations' had a positive impact specifically on the composition of financial asset portfolios containing stocks. Lastly, 'education level' was observed to positively affect only the selection of financial asset portfolios containing stocks.

Some of our findings deviate from expectations, largely due to the unique characteristics of Vietnam's nascent stock market. Furthermore, despite the wealth of information available, investors in this market have often failed to leverage it effectively due to their limited knowledge. Paradoxically, even successful investors can fall into the trap of assuming they know the market inside out, only to find themselves unable to pinpoint the reasons behind their failures.

Our research results unmistakably underscore the prevalence of overconfidence among market participants in Vietnam. These findings should serve as a stark reminder that their financial literacy falls significantly short of the market's demands. Consequently, both investors and regulators should devise plans for transformation to meet the prerequisites for sustainable market development.

Enhancing financial knowledge empowers investors to heighten their competitiveness in the market, thereby bolstering safety and reducing risk in financial investments.

While this paper has achieved some notable successes, it is essential to acknowledge certain limitations. The sample size of survey responses remains relatively small, and there has been no categorization of market participants for the survey. Our forthcoming research endeavors will focus on addressing these shortcomings by expanding the sample size and implementing participant categorization based on factors such as frequency of participation and their employment status, specifically distinguishing those who have access to the stock market as employees at financial institutions from others.

Furthermore, in our future studies, we intend to explore the realm of derivatives knowledge within the Vietnamese stock market. This exploration aims to scrutinize the connection between derivatives knowledge and the participants' capacity to engage effectively in the financial market.

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