

RESEARCH ARTICLE



The role of learning motivation on financial knowledge among Vietnamese college students

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Abstract

Using survey data from 730 undergraduates in Vietnam, we find that learning motivation and its components, especially self-efficacy, finance learning value, and achievement goals, significantly correlate with students' financial literacy performance. In addition, these correlations are moderated by student characteristics, among which academic seniority, university type, parents' education, and extra math study during high school matter the most. Our results raise significant implications to policymakers, researchers, and educators that include understanding the role of motivation and incorporating it in financial literacy education and intervention programs and considering the moderation roles that individuals' characteristics play in the motivation-financial literacy link. We encourage more research in these areas.

KEYWORDS

financial knowledge, financial literacy, motivation, self-efficacy, Vietnam

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1 | INTRODUCTION

Financial literacy, the ability to understand and effectively use economic and financial information, is essential to one's financial well-being.¹ Many studies have shown that people with high financial literacy save more, borrow less, better plan for their retirement, and are more likely to participate in stock markets (e.g., Christelis et al., 2010; Klapper et al., 2013; Lusardi & Mitchell, 2007, 2008; Lusardi & Mitchell, 2017; Tang & Baker, 2016; van Rooij et al., 2011). In contrast, poor financial literacy is associated with over-indebtedness, costly and risky borrowing, mortgage default, and inability to cope with negative income shocks (e.g., Courchane et al., 2004; Gerardi et al., 2013; Klapper et al., 2013; Lusardi & Tufano, 2015; Santini et al., 2019; Stango & Zinman, 2009).

The importance of financial literacy becomes even more critical these days when financial services and products are more accessible to many people thanks to the rapid growth of financial technology. Failure to equip investors and customers with sufficient financial knowledge to make informed financial choices could jeopardize not only their financial health but also the stability and efficient growth of the entire financial system (e.g., Klapper & Lusardi, 2020; Widdowson & Hailwood, 2007). Governments and educators have implemented numerous interventions to improve financial literacy, including one-to-one counseling, financial seminars, workshops, training courses, and interactive web-based programs. However, these efforts are apparently not very effective. In a meta-analysis, Fernandes et al. (2014) find that financial education interventions in 90 empirical studies prior to 2014 account for only 0.1% of the variance in financial behaviors, and that the effect is weaker in low-income samples and becomes negligible after 20 months. Based on data from the Standard & Poor's 2014 Ratings Services Global Financial Literacy Survey spanning 140 countries, Klapper and Lusardi (2020) find that only one in three adults are financially literate, and that financial illiteracy is significantly worse in developing countries. Low financial literacy is becoming an alarming global issue, and as a result, it is necessary to find better solutions to enhance financial knowledge.

Learning motivation involves beliefs, emotions, and strategies that help individuals to sustain the pursuit of their learning goals and is often conceptualized in various constructs including self-efficacy, performance goals, achievement goals, task value, and effort (e.g., Eccles & Wigfield, 2002; Garcia & Pintrich, 1995; Schunk et al., 2014). In this paper, we examine the role of learning motivation on financial literacy. There are several reasons for our study. First, we believe that external interventions to improve financial knowledge need to be accompanied by interventions to enhance the power of learning motivation. Bolduc (2000) states that "the best way to begin explaining why people are not successful (even when they know how to be) is by learning about the power of motivation." Educators have long believed that motivation affects what students learn and how well they apply these skills and knowledge. Studies on effective learning (e.g., Keller, 1987, 2010; Kuyper et al., 2000; Pintrich et al., 1993) acknowledge that motivation is the key to increasing learning outcomes because it is important for one's change process, critical thinking, learning strategy, and achievement. Researchers have reported ample evidence that learning motivation generally predicts students' academic performance (Crede & Phillips, 2011). Therefore, we expect learning motivation is positively correlated with financial literacy.

Second, the extant literature on financial literacy has reported various factors that affect financial literacy. They include age, gender, ethnicity, education, cognitive ability, employment, and parental background (e.g., Christelis et al., 2010; Grohmann et al., 2015; Lusardi, 2011; Lusardi et al., 2010; Tang & Peter, 2015). However, there is limited research on the impact of learning motivation on financial literacy. For example, Mandel and Klein (2007), who use data from the US national Jump\$tart survey of high school seniors, find that motivations to avoid

financial difficulty, pay bills, and save for retirement are significantly correlated with financial literacy scores. In a survey sample of 362 undergraduate students from a public university in the US, Jacobsen and Correta (2019) do not find a significant relation between students' motivation and their performance in the financial literacy test. Our study is motivated by these limited but important findings on the link between motivation and financial literacy. Our research is also in support of OECD's (2016) calling for more investigation into factors that are important to financial literacy and its associated outcomes.

Finally, this study responds to the call for more financial literacy research in different cultural and societal contexts (Goyal & Kumar, 2021). Our research is the first study that addresses the link between motivation and financial literacy in Vietnam. Klapper and Lusardi (2020) report that only 24% of surveyed adults in Vietnam could correctly answer at least three out of five financial literacy questions. Given that the Vietnamese government has increased education spending to 20% of its budget in recent years and that there has been an increasing number of education and training establishments,² low financial literacy has raised serious concerns to the government regarding the effectiveness of the country's education system. In addition, despite the involvement of various government bodies, organizations, education providers in developing and delivering financial education in Vietnam over the past decade, the impact of these programs on participants' financial literacy and financial behaviors are inconclusive due to lack of a rigorous evaluation framework (Nguyen, 2021).³ With the Decision No. 149/GD-TTg in 2020, the Vietnamese government has set ambitious objectives for its National Financial Inclusion (NFI) program to transform Vietnam into digital government, digital economy, and digital society by 2025–2030. One of the key objectives is to improve financial literacy of its people and small and medium-sized enterprises. Our research focus on students who are not only an essential group of the digital generation but also potential future entrepreneurs contributing to the country's economic growth. Hence, students' financial literacy and its associated factors are critically important to policymakers and educators for the success of the NFI program.

The rest of the paper is organized as follows. Section 2 reviews related literature and states the hypotheses. Section 3 presents data and sample statistics. Section 4 displays the results on the determinants of financial literacy. Section 5 discusses the results' implications and limitations.

2 | LITERATURE REVIEW AND HYPOTHESES

Using the 2014 S&P Global Financial Literacy Survey for 140 countries, Klapper and Lusardi (2020) find that the average financial literacy among young adults between 15 and 35 years of age is only 35%, and this is driven by those from emerging economies. Within this sample, Vietnam's overall rank is relatively low with 24% of its surveyed participants are financially literate. Compared to its Southeast Asian neighbors, it is higher than Cambodia (18%), similar to the Philippines (25%), and lower than Thailand (27%), Indonesia (32%), Malaysia (36%), Myanmar (52%), and Singapore (59%). The low financial literacy, together with 69% of the country's population not having a bank account,⁴ poses challenges to the government's NFI program since financially inexperienced users may not be able to optimize the benefits of (digital access to) financial products and services and avoid consumer risks if they do not possess sufficient financial knowledge.

A deficiency in basic financial literacy could result in an individual's poor decisions to save, borrow, and invest. The extant literature has reported ample evidence on the negative impact of

financial illiteracy. For example, Lusardi and Mitchell (2017) show that people with lower financial knowledge are less likely to plan for retirement. These poor planners possess significantly less wealth than their peers as they approach retirement. Inadequate understanding of interest rates can result in higher levels of borrowing, less accumulated wealth, and poor mortgage decisions (e.g., Campbell, 2006; Courchane et al., 2004; Gerardi et al., 2013; Stango & Zinman, 2009). Moreover, poor financial decisions due to lack of debt literacy abound in the literature: engagement in payday loans, high-cost borrowing, and excessive dependence on debt (e.g., Bolognesi et al., 2020; Charron-Chenier, 2020; Lusardi & Tufano, 2015; Santini et al., 2019). Van Rooij et al. (2011) and Almenberg and Dreber (2015) show that financial illiteracy also negatively affects willingness to participate in the stock market. Nguyen and Nguyen (2020) report similar evidence on stock market participation for Vietnam. Mai et al. (2020) find that lower financial knowledge is negatively correlated with the likelihood of purchasing life insurance while Pham et al. (2019) show a positive association between access to finance and financial literacy of owner-managers in a sample of 400 small and medium-sized enterprises in Vietnam.

Although researchers have reported evidence on various factors that influence the acquisition of financial knowledge, including gender, age, education background, and familial background (e.g., Annabi et al., 2018; Klapper & Lusardi, 2020), the role of learning motivation is less known and hence the focus of our research. Motivation is a broad concept and can be captured in a variety of ways (e.g., Bozanoglu, 2004; Helaakoski & Viiri, 2012; Pintrich et al., 1991; Uguroglu et al., 1981). Schunk et al. (2014) provides a general definition of motivation as a “process whereby goal-directed activities are instigated and sustained.” With this definition, motivation involves beliefs, emotions, and strategies that help individuals to initiate and sustain physical and mental activities and surmount difficulties and setbacks as they pursue their goals. Although motivation can manifest itself in various contexts, researchers in learning motivation have shown that motivation can affect what, when, and how students learn and acquire new knowledge (e.g., Schunk & Zimmerman, 2008). Among many theories on motivation, the expectancy-value model of motivation (e.g., Eccles, 1983; Eccles et al., 2015; Pinder, 1998; Pintrich et al., 1991) is arguably the most widely used. In this model, motivation is comprised of expectancy, value, and affective components, generally representing individuals’ beliefs in their ability to perform a task, reasons for performing that task, and emotional reactions to the task, respectively. These components are then conceptualized variously as self-efficacy, control beliefs, performance goals, achievement goals, task value, effort, intrinsic goal orientation, test anxiety, and self-regulated learning (e.g., Eccles & Wigfield, 2002; Garcia & Pintrich, 1995; Pintrich & Blumenfeld, 1985; Schunk et al., 2014). In meta-analyses of the literature, Crede and Phillips (2011) and Richardson et al. (2012) find evidence that motivational components significantly correlate with students’ academic performance.

In this paper, we follow Tuan et al. (2005) to measure finance learning motivation through six underlying factors: self-efficacy, active learning strategies, finance learning value, performance goals, achievement goals, and learning environment stimulation. These motivation components are not only consistent with Schunk et al. (2014) above-defined motivation but also advocated by supporters of constructivist theory of learning (e.g., Mintzes et al., 1998; von Glasersfeld, 1998). Students’ self-efficacy refers to beliefs about their capabilities or confidence in their ability to accomplish a task (e.g., Bandura, 1997). Students with higher self-efficacy in learning tend to seek more challenging tasks, expend greater effort to learn and achieve the learning outcome, and show more persistence at difficult tasks (e.g., Schunk & Pajares, 2009). Bandura (1997) asserts that differences in the modes of influence lead to changes in coping behavior by creating and strengthening expectations of personal efficacy. Studies have found that self-efficacy exhibits a positive correlation with learning motivation; that is, the stronger

students' beliefs in their capabilities for learning, the higher their motivation (e.g., Pintrich & DeGroot, 1990; Tuan et al., 2005). Another positively associated component of motivation is active learning strategies, which refer to the use of strategies to construct new knowledge based on previous understandings (e.g., Tuan et al., 2005). Active learning is operationalized by cognitive, metacognitive, affective, and resource management learning strategies (Anthony, 1996). Anthony (1996) postulates that active learning is the key factor that helps students to effectively cope with high demands in a constructivist learning environment. Students who engage in active learning strategies better attain learning outcomes (e.g., Barkley, 2010; Walker & Whiteside, 2009).

Learning value refers to the values that students attain during learning or beliefs about the reasons that students engage in learning tasks (e.g., Eccles, 2005; Schunk et al., 2014). While students might have a variety of reasons for why they learn, in our study, the surveyed reasons include acquiring problem-solving competency, experiencing an inquiry activity, stimulating one's own thinking, and finding the relevance of financial knowledge in daily life. If students perceive these values as important, they will be motivated to learn finance subjects. Tuan et al. (2005) show that students with high motivation perceive significantly higher value in learning science than those with low motivation. Goals are cognitive representations of what students are trying to attain and can be classified into performance and achievement goals (e.g., Brophy, 1998; Tuan et al., 2005). Students with high performance goals focus on outperforming their peers (e.g., Pintrich & Schunk, 1996) whereas those with high achievement goals are intrinsically motivated to accomplish learning tasks for their own competence (e.g., Deci & Ryan, 1991; Pintrich, 2000). Finally, learning environment stimulation considers how classroom activities and student-teacher interactions influence students' motivation (e.g., Brophy, 1998). Huang and Waxman (1995) postulate that differences in learning motivation results in variation in perceptions of the learning environment. In addition, teaching methods and the relationship between teachers and students also impact students' motivation (Hanrahan, 1998).

Since motivation is a process, it cannot be observed directly. Rather, it is measured via a combination of inter-related motivational variables. For example, self-efficacy and learning value can affect students' choices of active learning strategies (i.e., engagement, persistence, and effort). Effective use of learning strategies, in turn, promotes the acquisition of skills and attainment of goals, and leads students to feel more confident in their learning ability (e.g., Schunk & Pajares, 2009). In addition, learning environment can stimulate or discourage students' confidence and perceived learning value, which then affect their choices of engagement and learning strategies (e.g., Hanrahan, 1998; Schunk et al., 2014).

Given the above literature regarding the importance of learning motivation and its components in constructivist learning and acquiring knowledge, we expect that motivational variables have significant correlations with students' performance in the financial literacy test. Hence, we state our first hypothesis as follows:

Hypothesis 1. Learning motivation and its components are positively associated with financial literacy.

Learning motivation can be influenced by personal, familial, and social factors (e.g., Eccles & Wigfield, 2002). For example, Else-Quest et al. (2010) analyze OECD's Programme for International Student Assessment (PISA) data covering 69 countries and find a significant gap between male and female high school students in their motivation to learn math. Gender-related motivation differences are also found in Kurtz-Costes et al. (2008) and Leaper et al. (2012). Researchers also report evidence that academic motivation shifts from childhood to adolescence to young adulthood

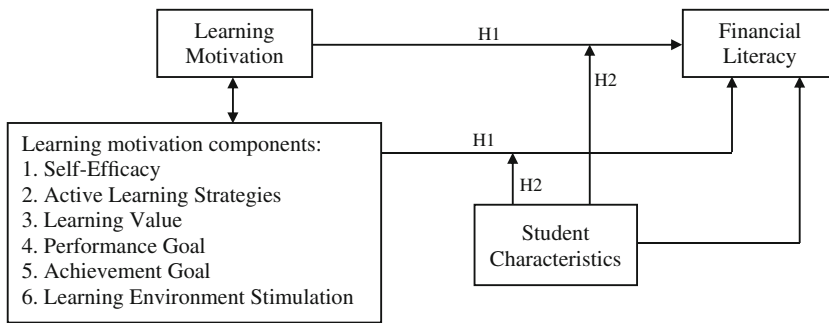


FIGURE 1 Hypotheses on the relations between learning motivation, its components, and student characteristics on financial literacy.

(e.g., Bugler et al., 2016; Jacobs et al., 2002; Symonds et al., 2019) and that individuals select majors based on their motivation to attain academic goals (e.g., Eccles & Wigfield, 2002; Feather, 1988). Parents' education and expectations are other factors that affect students' academic motivation (e.g., Davis-Kean, 2005; Frome & Eccles, 1998; Leaper et al., 2012; Mansour & Martin, 2009). In addition, it is a widespread practice for parents in Vietnam and many other countries to send their children to private tutoring (e.g., Glewwe & Kremer, 2006). The positive effect of private tutoring on academic performance is reported in many countries including Vietnam, India, Israel, Japan, and Germany (e.g., Banerjee et al., 2007; Dang, 2007; Lavy & Schlosser, 2005; Mischo & Haag, 2002; Ono, 2007). However, a recent study by Dang et al. (2020) shows that taking extra math classes is negatively related to the 2012 PISA test scores across students from 62 countries. Since extra math study affects motivation (e.g., self-efficacy), it is important to examine how their interaction influence students' financial literacy performance. Finally, differences in tuition subsidies and entrance requirements between public and private universities in Vietnam may affect students' motivation toward academic achievement.

Given the above discussions, we expect that students' demographic characteristics such as gender, academic seniority, study major, parents' education, extra math study during high school, and type of university, could play a moderating role in the association between learning motivation and financial literacy performance in our sample.

Hypothesis 2. Students' characteristics moderate the association between motivation and its components, and financial literacy.

We depict our two hypotheses in Figure 1.

3 | DATA AND SAMPLE STATISTICS

3.1 | Survey sample

Our data collection involves several steps. We first translated van Rooij et al. (2011) 16 financial literacy questions and Tuan et al. (2005) motivation questions⁵ (see Appendix B for our English versions of these questions). Next, we used these questions in a pilot test of 50 students to check the structure of our questionnaire design and the reliability of our learning motivation measures.⁶ The main survey was then conducted between March and July 2020.⁷

Survey participants were students from four public universities (Industrial University of Ho Chi Minh City, Saigon University, University of Economics Ho Chi Minh City, and University of Finance – Marketing) and two private institutions (Bach Viet College and Hoa Sen University) in Ho Chi Minh City. We designed the questionnaire via “Google Form” and required participants to answer all questions to prevent missing data. After having received permissions from senior administrators (i.e., Deans, Heads of School) in those six universities,⁸ we sent the Google link to their administrative staff and asked them to distribute the survey link, via email, to a random sample of 200 students per institution. The selected students chose to join the survey on a voluntary basis without any monetary incentive and could quit at any point during the survey. Their responses to the questionnaire were automatically saved in our Google Form, and the participating universities’ administrators would not know who took part in the survey. The survey received 730 responses out of 1200 survey invitations, representing a 60.83% response rate. Our survey not only assesses students’ financial literacy and motivation but also obtains several student characteristics that may affect the relation between financial literacy scores and motivation. These characteristics include gender, academic year, study major, university type, parents’ education, and extra math study during high school and are presented in Table A1 in the Appendix A. Table A2 in the Appendix A shows the pairwise correlations among the variables.

3.2 | Financial literacy

Our main dependent variable is a financial literacy score, FILIT (e.g., Bottazzi & Lusardi, 2021). As indicated earlier, we use the set of 16 questions in van Rooij et al. (2011) and assign one point for each correct answer and zero for unknown and wrong answers. This method is consistent with previous studies (e.g., Bonte & Filipiak, 2012; Cupak et al., 2019; Lusardi et al., 2014; Robson & Peetz, 2019; Xiao & O’Neill, 2016). Figure 2 displays the distribution of correct answers. Roughly 50% of the students in our sample correctly answered at least nine of the 16 questions. No student achieved 100% correct answers whereas 19 students selected wrong answers to all 16 questions. Other statistics show that slightly more than one third of the students attempted to answer all questions, that is, without choosing the “do not know” option. Another 37% of the sample students selected this option for fewer than two questions.

Van Rooij et al. (2011) 16 financial literacy questions include two subsets: the first five questions assess basic financial literacy, and the remaining 11 questions measure more advanced financial knowledge. In Figure 3, we show the proportions of correct, incorrect, and “do not know” answers to the five basic financial knowledge questions. On average, 60% of the student participants correctly worked out the answers for these basic financial questions, 31% did not answer them correctly, and the remaining 9% selected “do not know.” The question on time value of money appeared to be the most difficult for the students with only 42.5% managing to pick the correct answer and 17.8% selecting the “do not know” option.

3.3 | Learning motivation

Although the literature suggests several ways to measure learning motivation (e.g., Helaakoski & Viiri, 2012; Pintrich et al., 1991), we follow Tuan et al. (2005) to measure learning motivation (LMOV) with six components: self-efficacy (SELF), active learning strategies (ACTV), finance learning value (VALU), performance goals (PERF), achievement goals (ACHI), and learning

environment stimulation (ENVI). SELF measures students' ability to perform well in finance learning tasks. ACTV assesses how active students use various learning strategies to consolidate existing knowledge and construct new one. VALU captures whether students find value in obtaining finance knowledge. PERF and ACHI measure students' attitude toward finance learning goals. Students with high performance goals, PERF, focus on outperforming peers and getting attention from the teacher (e.g., Pintrich & Schunk, 1996) whereas those with high achievement goals, ACHI, are intrinsically motivated to accomplish learning tasks for their own competence (e.g., Deci & Ryan, 1991; Pintrich, 2000). Finally, ENVI considers how classroom activities and student-teacher interactions influence students' willingness to participate in finance learning.

For each item, student participants selected one response from a five-point Likert scale. These scales range from one for "strongly disagree" to five for "strongly agree." The 35 items for learning motivation are listed in the Appendix B. Where necessary, we adjusted an item score so that a higher score indicates a higher level of motivation; a bracketed negative sign following a question indicates such adjustment.⁹ An example is question 2 for self-efficacy: "I am not confident about understanding difficult financial concepts." A student strongly agreeing with this statement displayed low self-efficacy. Therefore, we reversed the student's score of five to one.¹⁰

We tested each learning motivation component's reliability through internal consistency of the items within each component. The Cronbach's alphas are greater than 0.70, conforming to guidance for reliable scales (Hair et al., 2014). Specifically, the alpha is 0.75 for self-efficacy, SELF, with seven items; 0.88 for active learning strategies, ACTV, with eight items; 0.84 for finance learning value, VALU, with five items; 0.86 for performance goals, PERF, with four items; 0.84 for achievement goals, ACHI, with five items; and 0.83 for learning environment stimulation, ENVI, with six items. These alphas are comparable to those reported in Tuan et al. (2005). In Panel A of Table 1, we report the standardized factor loading statistics using the varimax rotation method from the exploratory factor analysis (EFA). Thirty-three out of 35 items are factored into six groups. All factors maintain the number of items expected to measure their respective constructs, except SELF, with five items instead of seven. We omit items SELF1 and SELF3 due to their factor loadings less than 0.5.¹¹ The Kaiser-Meyer-Olkin measure of sampling adequacy equals to 0.905 ($p < 0.001$). The communalities of the items are greater than 0.3. Six factors have eigenvalues greater than one, accounting for 62% of the common variance across the 33 remaining items. These factor analysis results indicate that our factors are well-specified and appropriate for further analysis.

We next assessed the convergent and discriminant validity of the constructs. Panel B of Table 1 shows that the average variance extracted (AVE) satisfies the minimum requirement of 0.50 (Hair et al., 2014). In addition, the maximum shared variance (MSV) is less than the AVE for all constructs, and the square root of the AVE for each construct is higher than all correlations between that construct and all other constructs. These results support both convergent and discriminant validity of our motivation components. The unreported results also show all construct reliability measures of the motivation components are larger than 0.8, indicating adequate convergence or internal consistency.

4 | RESULTS

4.1 | Learning motivation and financial knowledge

In this section, we estimate the association of learning motivation and its six components with the proportion of correct answers to financial literacy questions, FILIT.¹² We estimate this

Distribution of Financial Knowledge

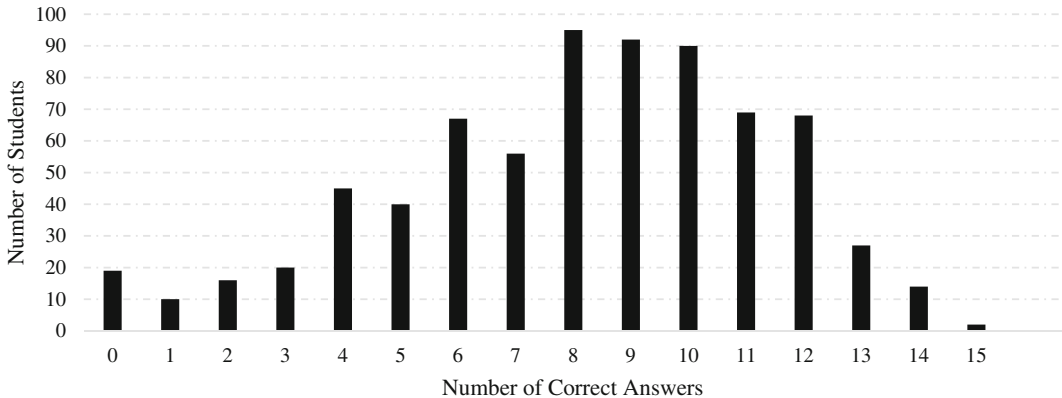


FIGURE 2 This figure shows the distribution of number of respondents who correctly answered the 16 questions on financial literacy. The total number of respondents is 730.

relationship using ordinary least squares (OLS) regression and structural equation modeling (SEM). For OLS regressions, a component score (e.g., ACHI) is averaged across the items within that motivation component, and learning motivation, LMOV, is a simple weighted average of component averages.¹³

The result in column (1) of Table 2 shows that learning motivation is strongly and statistically correlated with financial literacy scores. The coefficient of 0.111 indicates that a change by one standard deviation of 0.414 in learning motivation is associated with a 0.046 ($=0.111 \times 0.414$) increase in the proportion of correct answers in the financial literacy test. This represents a 9% increase from the mean value of 0.506. The results in column (2) for individual components show that self-efficacy and finance learning value are significantly associated with better financial literacy performance. Holding all other component scores constant, a one-standard deviation change of 0.868 in self-efficacy mean score is associated with a 0.046 ($=0.053 \times 0.868$) change in the proportion of correct responses to financial literacy questions. Similarly, the proportion of correct answers increases by 0.028 for a one-standard deviation change in finance learning value. In our student sample, active learning strategies, performance goals, achievement goals and learning environment have statistically insignificant coefficients, and thus seem not to correlate with financial literacy scores after controlling for self-efficacy and finance learning value.

Since simple averaging the items to measure learning motivation may lead to inefficient and inaccurate findings, we use SEM as an alternative method to confirm the OLS results because SEM is able to simultaneously consider the structure of mean, variance, and covariance of the constructs in its analysis (e.g., Nazim & Ahmad, 2013). The results for SEM, presented in columns (3) and (4) of Table 2, are consistent with the OLS results. The result of LMOV ($\beta = 0.798$, $p < 0.001$) in column (3) is from a second-order effect SEM regression in which the six components relatedly account for the underlying construct of motivation, which exhibits a positive association with financial literacy scores. Column (4) shows the first-order effect SEM regression result in which we evaluate the direct correlation of motivation components with financial literacy performance. We find significantly positive correlations between financial literacy with self-efficacy ($\beta = 0.284$, $p < 0.001$) and learning value ($\beta = 0.156$, $p < 0.05$) but

Basic Financial Knowledge

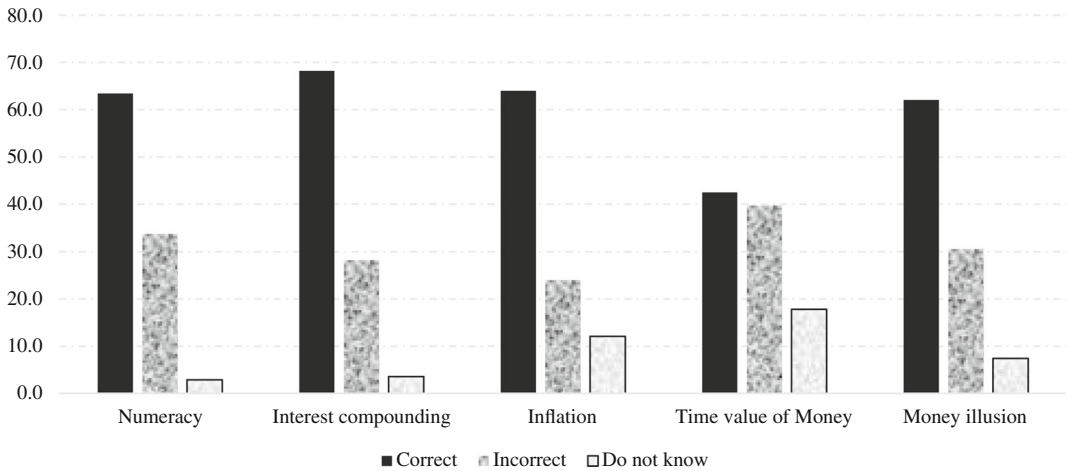


FIGURE 3 This figure shows the distribution of correct, incorrect, and “do not know” answers to the five questions on basic financial literacy. The total number of respondents is 730.

insignificant coefficients for other learning motivation constructs. We show the common fit statistics for the SEM regressions as suggested in Hair et al. (2014, p. 584). The standardized root mean square residual (SRMR) of 0.0684 is smaller than the 0.08 upper threshold for a sample of our size, suggesting acceptable fit (e.g., Hair et al., 2014; Hu & Bentler, 1999; West et al., 2012). Our models' root mean square errors of approximation (RMSEAs), 0.0660 and 0.0658, are also within the range of 0.05 and 0.08 suggested in the literature (e.g., Hu & Bentler, 1999; Steiger, 2007; West et al., 2012). The comparative fit index (CFI) for our SEM models should be at least 0.90 (Hu & Bentler, 1999); however, our CFIs fall slightly short of this. Overall, these fit statistics lend some support to our first hypothesis of the positive association between learning motivation and financial literacy.

4.2 | Students' characteristics

To further examine the effect of learning motivation on financial literacy, we include students' characteristics, as reported in Table A1 in the Appendix A, in our analysis and report the results in Table 3. In the first column, we only include these characteristics in the OLS regression. The adjusted R^2 results show that these variables help explain about 14% of variance in the students' financial literacy scores. In other columns, we include learning motivation and its components in the regression to assess their separate roles in financial literacy performance after controlling for the characteristics in column (1). We find that the LMOV coefficient remains strongly significant and has a slightly larger magnitude than that in column (1) of Table 2. Importantly, it improves the adjusted R^2 of the regression to 20%, indicating a 44% increase from the 13.9% R^2 in column (1). Individual components of learning motivation are also statistically significant and positively correlated with financial literacy scores, except performance goals, PERF, and learning environment stimulation, ENVI. These components contribute variably to the model R^2 , with self-efficacy, SELF, being the largest contributor; financial learning value, VALU, second; and active learning strategies, ACTV, third.



TABLE 1 Factor analyses.

Panel A: EFA standardized factor loadings							
	Motivation components						Communalities
	SELF	ACTV	VALU	PERF	ACHI	ENVI	
SELF5	0.775						0.624
SELF4	0.758						0.603
SELF6	0.715						0.567
SELF7	0.715						0.565
SELF2	0.663						0.473
ACTV5		0.777					0.635
ACTV3		0.740					0.629
ACTV8		0.719					0.597
ACTV4		0.704					0.556
ACTV6		0.684					0.547
ACTV2		0.673					0.559
ACTV1		0.590					0.534
ACTV7		0.539					0.451
VALU1			0.737				0.652
VALU2			0.735				0.721
VALU3			0.717				0.600
VALU4			0.646				0.540
VALU5			0.564				0.558
PERF2				0.827			0.742
PERF3				0.812			0.791
PERF4				0.800			0.773
PERF1				0.695			0.590
ACHI4					0.730		0.685
ACHI1					0.715		0.637
ACHI5					0.703		0.638
ACHI2					0.687		0.619
ACHI3					0.659		0.657
ENVI3						0.707	0.602
ENVI2						0.693	0.685
ENVI6						0.688	0.630
ENVI5						0.617	0.589
ENVI1						0.572	0.641
ENVI4						0.560	0.625
Initial eigenvalues							Total
Total initial eigenvalues	9.59	4.46	1.92	1.73	1.44	1.17	20.32
% of variance	29.06	13.51	5.82	5.24	4.38	3.56	61.56

Panel B: CFA convergent validity and discriminant validity

	CR	AVE	MSV	Correlation between constructs					
				SELF	ACTI	ACHI	VALU	PERF	ENVI
SELF	0.800	0.500	0.231	0.707					
ACTI	0.877	0.504	0.489	0.175	0.710				
ACHI	0.844	0.524	0.415	−0.050	0.561	0.724			
VALU	0.839	0.513	0.489	0.186	0.699	0.602	0.716		
PERF	0.855	0.606	0.231	0.481	−0.179	−0.211	−0.101	0.778	
ENVI	0.842	0.519	0.48	0.004	0.615	0.644	0.693	−0.343	0.721

Note: The number ending each construct name corresponds to its order in the construct's survey questions shown in the Appendix B. The square root of the AVEs for each construct appears on the diagonal in boldface. CFA fit statistics:

$\chi^2 = 1728.122$, d.f. = 390, SRMR = 0.069, RMSEA = 0.069, CFI = 0.880.

Abbreviations: ACHI, achievement goals; ACTV, active learning strategies; AVE, average variance extracted;

CR, construct reliability; ENVI, learning environment stimulation; MSV, maximum shared variance; PERF, performance goals; SELF, self-efficacy; VALU, finance learning value.

The statistical significance and coefficient size of the characteristic variables are relatively stable across different regressions. The coefficient for the MALE dummy variable is positive with $p < 0.01$, indicating that male students exhibit better financial literacy than female students who account for 65.5% of our sample.¹⁴ The 0.049 coefficient in column (1) suggests that the proportion of correct answers to the 16 financial literacy questions is about 5% lower for female students compared to male students. This evidence is consistent with the literature (e.g., Klapper & Lusardi, 2020; Lusardi et al., 2010; Tang & Peter, 2015). For example, Klapper and Lusardi (2020) show that, all else being constant, the probability of getting three out of four financial literacy questions correct is 4% lower for female adults than male adults.

Academic seniority, AYR, does not seem to correlate with performance in the financial literacy test. This could be due to lack of variation across academic years since, as shown in Table A1 in the Appendix A, more than 55% of the students were at least in their third year in college, and freshmen represented only a fractional 4% of our sample.¹⁵ ACFI is a dummy variable which equals to one for students majoring in accounting and finance and zero for other majors. Its positive value ($p < 0.001$) indicates that accounting and finance students score significantly better on financial literacy than other students. The result for the PUBLIC dummy variable ($p < 0.001$) indicates that students studying at the four public universities in our sample possess better financial knowledge than those from the two private universities. This result can be explained with Vietnam's education system, in which public universities are often leading universities with tuition fees partially subsidized by the government. Their entrance requirements are generally more competitive; as a result, only students with relatively high grades gain access to these universities.¹⁶

Approximately 38% of the students' parents had a bachelor degree or higher and almost 30% possessed only secondary education or lower. The PAEDU variable is equal one if the education of a student's parents is secondary school or lower, two for high school, three for university bachelor, and four for higher education. We find a significantly negative ($p < 0.001$) association between parents' education, PAEDU, and students' financial literacy, suggesting that students with better educated parents tend to score lower in the financial literacy test. This evidence is opposite to the positive link between parents' education and financial knowledge reported in



TABLE 2 Financial literacy and learning motivation.

	OLS		SEM	
	(1)	(2)	(3)	(4)
Learning motivation (LMOV)	0.111*** (6.29)		0.798*** (66.77)	
Self-efficacy (SELF)		0.053*** (5.52)		0.284*** (5.79)
Active learning strategies (ACTV)		−0.002 (−0.11)		−0.029 (−0.46)
Finance learning value (VALU)		0.040** (2.77)		0.156* (2.17)
Performance goals (PERF)		−0.002 (−0.27)		−0.049 (−0.97)
Achievement goals (ACHI)		0.022 (1.69)		0.102 (1.73)
Learning environment stimulation (ENVI)		−0.016 (−1.31)		−0.095 (−1.29)
Intercept		0.156* (2.26)		
Adj. R^2	0.050	0.076		
N	730	730		
Chi-Square χ^2			1844	1844
d.f.			428	414
Pr > χ^2			0.0000	0.0000
SRMR			0.0684	0.0684
RMSEA			0.0660	0.0658
CFI			0.8751	0.8753

Note: The dependent variable is the proportion of correct answers to the 16-questions of financial literacy, FILIT. For OLS regressions, the value for each motivation component is the average score of the survey items for that component. Learning motivation is the simple average of the six components' average scores. The numbers in parentheses are robust *t*-statistics.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Lusardi et al. (2010) and Tang and Peter (2015). Finally, we include the EXSTU variable to capture the frequency of students' extra math study during high school with one being never or rarely, two sometimes, three often, and four always. A common practice of parents in Vietnam and many other developing countries is to send their children to private tutoring (e.g., Glewwe & Kremer, 2006). The EXSTU coefficient is not significant, suggesting that taking private math classes outside of school hours does not help students to improve financial literacy. This result is inconsistent with Dang (2007), who finds that private tutoring help improve academic performance of primary and lower secondary school students in Vietnam. However, extra math studies are, on average, negatively associated with PISA assessment scores across 63 countries (Dang et al., 2020).

TABLE 3 Effects of learning motivation and other characteristics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		LMOV	SELF	ACTV	VALU	PERF	ACHI	ENVI
Learning motivation/components		0.122*** (7.55)	0.052*** (6.49)	0.044*** (4.04)	0.055*** (5.63)	0.014 (1.88)	0.033*** (3.44)	0.013 (1.40)
Male (MALE)	0.049** (3.18)	0.047** (3.17)	0.043** (2.88)	0.047** (3.07)	0.046** (3.07)	0.052*** (3.38)	0.049** (3.21)	0.048** (3.10)
Academic years (AYR)	0.000 (0.02)	0.002 (0.32)	0.006 (0.86)	0.000 (−0.02)	0.001 (0.16)	0.000 (0.05)	−0.001 (−0.07)	0.000 (−0.01)
Accounting and finance majors (ACFI)	0.067*** (4.54)	0.072*** (5.01)	0.070*** (4.89)	0.069*** (4.68)	0.068*** (4.68)	0.071*** (4.79)	0.066*** (4.46)	0.066*** (4.44)
Public universities (PUBLIC)	0.106*** (6.29)	0.116*** (7.26)	0.108*** (6.59)	0.111*** (6.66)	0.111*** (6.75)	0.105*** (6.25)	0.111*** (6.68)	0.109*** (6.49)
Parental education (PAEDU)	−0.031*** (−4.23)	−0.029*** (−4.23)	−0.029*** (−4.03)	−0.031*** (−4.37)	−0.032*** (−4.54)	−0.030*** (−4.11)	−0.030*** (−4.24)	−0.031*** (−4.25)
Extra math study during high school (EXSTU)	0.006 (0.88)	0.003 (0.45)	0.006 (0.88)	0.005 (0.67)	0.004 (0.61)	0.006 (0.83)	0.004 (0.64)	0.006 (0.87)
Intercept	0.445*** (11.50)	−0.008 (−0.11)	0.252*** (5.46)	0.279*** (4.99)	0.225*** (4.14)	0.393*** (8.37)	0.318*** (6.02)	0.402*** (8.39)
Adj. R ²	0.139	0.200	0.188	0.159	0.174	0.142	0.153	0.140
N	730	730	730	730	730	730	730	730

Note: The dependent variable is the proportion of correct answers to the 16-questions of financial literacy, FLIT. The value for each motivation component is the average score of the survey items for that component (see Table 1). Learning motivation, LMOV, is the simple average of the six components' average scores. MALE equals one for male students, and zero otherwise. Academic years, AYR, range from one to four for freshmen, sophomores, juniors, and seniors, respectively. ACFI is equal to one for the students with accounting and finance majors, and zero otherwise. PUBLIC has a value of one for the students from public universities, and zero otherwise. PAEDU is one if the education of a student's parents is secondary school or lower, two for high school, three for university bachelor, and four for higher education. EXSTU represents the frequency of extra math study with one being never or rarely, two sometimes, three often, and four always. The numbers in parentheses are robust *t*-statistics.

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

TABLE 4 Moderation effects of motivation and other characteristics.

	(1)	(2)	(3)	(4)	(5)	(6)
Learning motivation (LMOV)	0.114*** (5.50)	−0.005 (−0.11)	0.126*** (6.47)	0.184*** (6.49)	0.032 (0.90)	0.221*** (4.66)
Male (MALE)	−0.036 (−0.29)	0.041** (2.79)	0.047** (3.19)	0.047** (3.22)	0.045** (3.07)	0.047** (3.19)
Academic years (AYR)	0.002 (0.22)	−0.165** (−2.75)	0.003 (0.37)	0.005 (0.71)	0.003 (0.48)	0.002 (0.31)
Accounting and finance majors (ACFI)	0.071*** (4.91)	0.066*** (4.56)	0.123 (0.93)	0.070*** (4.92)	0.070*** (4.92)	0.071*** (5.00)
Public universities (PUBLIC)	0.115*** (7.21)	0.111*** (6.89)	0.116*** (7.24)	0.466*** (3.56)	0.118*** (7.43)	0.116*** (7.30)
Parent education (PAEDU)	−0.029*** (−4.23)	−0.028*** (−4.03)	−0.029*** (−4.22)	−0.030*** (−4.28)	−0.180** (−3.22)	−0.029*** (−4.15)
Extra math study during high school (EXSTU)	0.003 (0.45)	0.003 (0.49)	0.003 (0.45)	0.003 (0.46)	0.002 (0.33)	0.132 (2.31)
LMOV × MALE	0.023 (0.67)					
LMOV × AYR		0.045** (2.82)				
LMOV × ACFI			−0.014 (−0.39)			
LMOV × PUBLIC				−0.095** (−2.72)		
LMOV × PAEDU					0.041** (2.71)	
LMOV × EXSTU						−0.035* (−2.29)
Intercept	0.024 (0.28)	0.467** (2.63)	−0.025 (−0.30)	−0.247* (−2.18)	0.318* (2.36)	−0.373* (−2.08)
Adj. R ²	0.199	0.208	0.199	0.207	0.206	0.204
N	730	730	730	730	730	730

Note: All variables are defined as in Table 3. The numbers in parentheses are robust *t*-statistics.

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

4.3 | Moderation effects

In this section we discuss the results for hypothesis 2, that is, the moderation roles of students' characteristics in the relationship between learning motivation, LMOV, and financial literacy, FILIT. Table 4 presents results for the interactions between LMOV and characteristic variables in the regression.¹⁷ The first column shows that the LMOV × MALE interaction is not

TABLE 5 Moderation effects of motivation components and other characteristics.

	(1) SELF	(2) ACTV	(3) VALU	(4) PERF	(5) ACHI	(6) ENVI
Motivation Component $\times$ MALE	−0.005 (−0.27)	0.001 (0.03)	0.010 (0.48)	−0.013 (−0.82)	0.023 (1.09)	0.018 (0.93)
Motivation Component $\times$ AYR	0.016* (1.97)	0.025* (2.25)	0.013 (1.37)	0.004 (0.51)	0.013 (1.32)	−0.002 (−0.21)
Motivation Component $\times$ ACFI	0.004 (0.26)	−0.020 (−0.88)	−0.008 (−0.40)	0.020 (1.25)	−0.021 (−1.02)	−0.020 (−1.01)
Motivation Component $\times$ PUBLIC	−0.030 (−1.68)	−0.015 (−0.60)	−0.010 (−0.46)	−0.041* (−2.55)	−0.025 (−1.22)	−0.003 (−0.13)
Motivation Component $\times$ PAEDU	0.007 (0.81)	0.015 (1.48)	0.017 (1.69)	−0.002 (−0.24)	0.015 (1.75)	0.013 (1.43)
Motivation Component $\times$ EXSTU	−0.001 (−0.09)	−0.006 (−0.53)	−0.012 (−1.18)	−0.011 (−1.58)	−0.019* (−2.09)	−0.001 (−0.09)

Note: This table shows the OLS results of regressions similar to those in Table 4 except that the aggregate learning motivation, LMOV, is replaced with its components: self-efficacy (SELF), active learning strategies (ACTV), finance learning value (VALU), performance goals (PERF), achievement goals (ACHI), and learning environment stimulation (ENVI). There are a total of 36 regressions; for brevity, only the interaction coefficients are presented. The numbers in parentheses are robust *t*-statistics.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

significant, suggesting that while a gender-based difference exists in financial literacy scores, as shown in Table 3, gender does not explain the motivation for better performance in financial literacy. Similarly, the LMOV $\times$ ACFI coefficient in column (3) is insignificant, suggesting that the positive association between learning motivation and financial literacy scores does not depend upon study major.¹⁸

Other interactions in Table 4 show significant moderation effects. The result for LMOV $\times$ AYR ($p < 0.01$) in column (2) indicates motivation matters for higher financial literacy scores only for academically senior students. Specifically, for students with identical learning motivation scores, a one-year increase in academic seniority increases the proportion of correct answers in the financial literacy test by 4.5%. The coefficients of LMOV ($p < 0.001$) and LMOV $\times$ PUBLIC ($p < 0.01$) in column (4) suggest that university type moderates the positive correlation between learning motivation and financial literacy. The interaction coefficient of −0.095 indicates that the financial literacy score for a public university student is, on average, 9.5% lower than that of a private university student when both have similar learning motivations. In column (5), we find that learning motivation does not seem to play a role on financial literacy for students whose parents' education is relatively low. However, the LMOV $\times$ PAEDU coefficient is positive ($p < 0.01$), suggesting that motivation only matters for financial literacy performance in families where parents possess higher education. Finally, the result in column (6) shows that while the positive relation between motivation and financial literacy exists in general, this link is weaker for the students who took extra math classes more often during high school.¹⁹

In Table 5, we explore the moderation effects of students' characteristics on each component of learning motivation. Our regressions are similar to those in Table 4 except that we

replace the aggregate learning motivation variable with each of its six components, for a total of 36 regressions. Since our main interest is the interaction term, we only report the interaction coefficient of a motivation component and a characteristic variable. The results show that the interaction coefficients for MALE, ACFI, and PAEDU are not significant at $p < 0.05$ across motivation components. Academic seniority, AYR, positively and significantly ($p < 0.05$) moderates the association between self-efficacy, SELF, and active learning strategies, ACTV, and financial literacy. The correlation between performance goals, PERF, and financial literacy is lower ($p < 0.05$) for public university students, PUBLIC, than for private university students. Finally, the interaction coefficients for extra math studies, EXSTU, are negative across motivation components but only statistically significant ($p < 0.05$) for achievement goals, ACHI, suggesting that while achievement goals motivate students to acquire better financial knowledge, such motivation is significantly lower for students who engaged in extra math study more often during high school.

Overall, the results in Tables 4 and 5 show that students' characteristics exhibit varying degrees of moderation on the relationship between aggregate learning motivation and financial literacy. In addition, this moderation is relatively weak and varies across individual motivation components.²⁰

5 | DISCUSSION AND LIMITATIONS

5.1 | Discussion

Financial literacy is critical to individuals' financial well-being. Its significant role has been recognized by various governments, authorities, researchers, and educators, and tremendous efforts have been made to improve the quality of financial literacy of people across ages, genders, and ethnic, cultural, and social backgrounds. However, the effects remain limited, which warrants more research to better our understanding of the determinants of financial literacy. While the extant research, including many studies focusing on primary and secondary school students, widely acknowledge that learning motivation is a key factor in students' knowledge acquisition and academic performance, it has seldom addressed the effect of learning motivation on financial literacy. This association is even more important for young adults whose academic success or failure strongly influences their country's economic growth (e.g., Barro, 2003). Our paper addresses this important association, and the results confirm that learning motivation and its components strongly correlate with students' financial literacy scores. Importantly, this correlation is robust to the inclusion of other characteristic variables and improves the model's explanatory power by approximately 44%. This result has significant implications for policy and financial education. Fernandes et al. (2014) meta-analysis of 90 studies on the effects of educational intervention programs on financial behaviors show that the R^2 effects depend on the type of intervention (e.g., counseling, financial education in high school, participation in financial seminars and workshops) and are undesirably small ranging from 0.05% to 0.18%. They also find that interventions could explain only 0.44% of the variance in financial knowledge. Our results suggest that learning motivation should be an important factor when financial education intervention programs are designed.

Among the six components used to capture various aspects of motivation, Table 2 shows that self-efficacy and financial learning value play the most significant roles in students' performance in the financial literacy test. These are related to the inner forces of motivation and

consistent with the expectancy-value theoretical model of motivation (e.g., Eccles, 2005). These factors influence behaviors such as choice of tasks, level of effort, and persistence, which, in turn, affect the learning outcomes (e.g., Schunk et al., 2014). Our results are particularly relevant to Fernandes et al. (2014) finding that the effect of intervention becomes negligible on behavior after 20 months. We believe that if educators design financial education programs that could help trigger and maintain learners' motivational forces, these programs will have long-lasting effects on learning, including financial knowledge attainment.

Our further analyses provide important findings on the moderation roles of students' characteristics in the link between motivation and financial literacy. Among the significant interactions is academic seniority for which we show that the relationship between financial literacy performance and motivation, especially self-efficacy and active learning strategies, is stronger for students with higher academic seniority. This result is consistent with Symonds et al. (2019) that motivation shifts the most at the transition from school to work and suggests that the importance of motivation enhancement when students are closer to graduation and transition to employment. Another significant moderation result is for university type. Given that public universities in Vietnam are funded by the government, their entrance requirements are more competitive than privately funded universities. Therefore, we expect and find that students from public universities, in general, achieve better financial literacy scores than those from private universities. However, interestingly we find that the motivation–financial literacy link is worse for students at public universities. Table 5 shows that the attenuation role of public university is statistically significant only for performance goals. These results raise a noteworthy question as to why motivation matters more for students at private universities. While we are not aware of any existing research evidence in Vietnam on whether job opportunities are dependent on the type of university that applicants have graduated from, public perception appears to suggest that graduates from private universities face greater difficulty in finding jobs.²¹ This could explain why goals to outperform peers exhibit a more pronounced effect for private university students. Our evidence is also in line with Brunello and Rocco's (2008) model which shows that the educational standard of private schools relative to public schools depends on a number of factors, including the cost of effort, access to the labor market, and the cost–return trade-off.

While the independent and negative role that parents' education contributes to financial literacy for our sample of Vietnamese students is not consistent with studies in other countries (e.g., Lusardi et al., 2010; Tang & Peter, 2015), it is interesting to observe the interaction between motivation and parents' education. Motivation correlates to financial literacy more for students whose parents possess higher education qualifications, which is in line with the literature on the positive impact of parents' education on academic motivation (e.g., Davis-Kean, 2005; Leaper et al., 2012). On one hand, this result suggests that higher educated parents do a better job in motivating their children in attaining financial knowledge. On the other hand, the result raises an important policy implication: how educators and policymakers help boost the learning motivation of students with less educated parents. This is critical given that roughly two thirds of our sample students' parents possess high school qualification or lower.

Dang (2007) reports that almost 77% of high school students receive private tutoring. Dang and Rogers (2008, 2016) find that parents are willing to spend up to 5% of their household expenditures on their children's private tutoring. This is probably because parents (a) want their children to earn higher marks, (b) believe that education quality during school hours is poor, and/or (c) do not want their children singled out by the teachers who provide the private tutoring service. Our results in Table 4 show that taking extra math classes more often during high school is useful only for students with low learning motivation in achieving better scores

for financial literacy. However, this extra math study matters significantly less for the financial literacy of students with high learning motivation. The results in Table 5 indicate that achievement competence plays the most significant role among the components of motivation. The results yield significant implications. First, parents should understand their children motivation before offering them extra study opportunities. Second, the effect of extra study is mixed in the literature: some studies find a positive effect (e.g., Banerjee et al., 2007; Lavy & Schlosser, 2005; Ono, 2007) whereas some others report a negative impact (e.g., Dang et al., 2020). Our results suggest that future research on extra study should consider how it interacts with motivation to influence academic performance in general and the quality of financial literacy in particular.

Apart from the above significant interaction results, we do not find that students' gender interferes with motivation in its relationship with students' performance in the financial literacy test. This result is not consistent with other studies that find significant gender-related motivation differences (e.g., Else-Quest et al., 2010; Kurtz-Costes et al., 2008; Leaper et al., 2012). Similarly, our analyses show that the motivation–financial literacy link does not differ between students who study accounting and finance and students in other majors.

5.2 | Limitations and avenues for future research

While our research contributes to the limited literature on the link between motivation and financial literacy and is the first study of this kind on a Vietnam-based sample, it has limitations that future research can address. First, although the van Rooij et al. (2011) financial literacy questions we use for this study are widely employed in many other studies of different cultural samples (e.g., Lu et al., 2021; Lusardi & Mitchell, 2017; Phung et al., 2021; Sivaramakrishnan et al., 2017), they may need to be tailored and validated further to suit the educational and social systems of Vietnam. In addition, these questions should be relevant to the financial behaviors examined, which is a promising avenue for research in Vietnam.

Second, we borrow the motivation scales from Tuan et al. (2005) and replace “science” with “finance” or “financial” for our purpose. Although we show that these scales perform well in the reliability test, the marginally acceptable fit statistics for SEM in Table 2 suggest that future research should consider adjusting or developing motivation scales that potentially better capture finance learning motivations, especially for Vietnamese survey respondents. Shi et al. (2019) show that apart from the sample size and the magnitude of factor loadings, the number of indicators significantly affects the values of SEM fit statistics. Despite the expectancy-value theory arguably being the most popular theory on motivation, there are other theories (e.g., social cognitive theory) that could explain the achievement of financial knowledge and its associated behaviors. Our different interaction results for motivation and its components suggest further investigation for the potential roles of other motivation theories.

Third, our results could be subject to reverse causality (e.g., students with higher financial literacy may become more motivated to study finance) or omitted variables. For example, students who have a part-time finance-related job may exhibit higher motivation to study finance and perform better in the financial literacy test. Parents' income and parental socialization also play a role in motivating their children's financial learning and achievement. In addition, psychological traits could affect a person's ability to think and learn (e.g., Fernandes et al., 2014; Sadowski & Cogburn, 1997), and hence their motivation and performance in financial literacy. Therefore, future studies that would extend the number of participants' and their familial

characteristics and address the possible endogeneity issue via instrument variables or experimental approaches are warranted.

Finally, the interaction results provided in Table A3 in the Appendix A for basic and advanced financial literacy invite further investigation as to why some characteristics matter more for advanced financial literacy and less for basic financial literacy.

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ENDNOTES

¹ We note that there are various definitions of financial literacy in the literature (e.g., Goyal & Kumar, 2021; Huston, 2010; OECD, 2014). In this paper, we follow the literature (e.g., Huang et al., 2013; Huston, 2010; Khan et al., 2017) and refer to financial literacy and financial knowledge interchangeably. In addition, the van Rooij et al. (2011) questions that we use capture both basic financial literacy and advanced financial knowledge.

² <https://www.statista.com/topics/6227/higher-education-in-vietnam/>

³ Nguyen (2021) finds that most financial education programs are evaluated for their content (i.e., process evaluation) whereas no program in his surveyed sample carries out an economic impact evaluation. Similar conclusions are also drawn in a report by MEFIN Network in 2018, https://www.mefin.org/docs/Overview_Publications/StudyReports/5./GIZRFPI_Vietnam_FinancialLiteracy_financialinclusion.pdf (mefin.org).

⁴ <https://www.gfmag.com/global-data/economic-data/worlds-most-unbanked-countries>. The World Bank's Global Findex 2017 shows that the percentage of financial institution accounts among young adults aged between 15 and 24 is 31%, significantly lower than the 67% average for countries within the East Asia - Pacific region.

⁵ Since we wanted to measure motivation to learn and acquire financial knowledge rather than science, we replaced the word "science" in Tuan et al. (2005) questions with "finance" or "financial" in our survey. For example, the original question 2 for self-efficacy "I am not confident about understanding difficult science concepts" was replaced with "I am not confident about understanding difficult financial concepts". Note that both "finance" and "financial" have the same meaning as "tài chính" in Vietnamese.

⁶ The reliability tests (through Cronbach's alpha) for all scale variables show that the Cronbach's alphas were greater than the conventional benchmark of 0.7, which provided us with confidence to proceed to the main survey.

⁷ It would take approximately 15 min to complete the survey. Although the survey was during the first wave of COVID-19, and there was a short lockdown in early March 2020, this did not affect our data collection since it was done online, and most students' responses were in late April and early May 2020. https://en.wikipedia.org/wiki/COVID-19_pandemic_in_Vietnam.

⁸ Note that ethics approval was not required for this study.

⁹ This notation was not shown to the students participating in the survey.

¹⁰ The simple formula for the conversion is: converted score = actual score * (-1) + 6.

- ¹¹ The exclusion of these two items has improved the reliability of the remaining five items to 0.81 from the initial value of 0.75.
- ¹² As a robustness check, we follow van Rooij et al. (2011) to create a financial literacy index. Specifically, we perform a factor analysis on a set of 16 dummy variables corresponding to the 16 financial literacy questions. Each dummy variable is equal to one for a correct answer and zero otherwise. Using SPSS AMOS, we obtain factor scores and the financial literacy index using the Bartlett (1937) method. Our results are highly robust when we replace the proportion of correct answers, FILIT, with this financial literacy index, which supports the validity of our financial literacy measure. We choose to use FILIT for ease of interpretation of the results. The robustness results are available upon request.
- ¹³ Note that based on the EFA results, we do not include SELF1 and SELF3 in the calculation of SELF component score.
- ¹⁴ The proportion of female students in our sample is higher than the proportion of female university student population in Vietnam. According to data statistics by the Vietnam Ministry of Education and Training (<https://moet.gov.vn/thong-ke/Pages/thong-ko-giao-duc-dai-hoc.aspx?ItemID=7389>), there were 1.5 million full-time university students in the academic year of 2019–2020, of which 55% were female students.
- ¹⁵ We replace academic year with age as a robustness check, and the unreported result is similar. 77% of our students were about 3–4 years of age apart.
- ¹⁶ In recent years, some private universities have started to target higher achieving students by requiring higher performance scores in the national entrance examination. <https://thanhnien.vn/giao-duc/vi-sao-mot-so-truong-tu-khong-con-o-chieu-duoi-1115991.html>.
- ¹⁷ Our results are not affected by multicollinearity. The VIF values range from 1.01 to 1.20 across the learning motivation and student characteristics variables. Learning motivation components have similar VIF values.
- ¹⁸ Some students in our sample, especially those whose majors are not in accounting, finance, or business-related areas, might not have attended finance courses, which could affect their answers to learning motivation questions. We re-estimate our models excluding these students and find that the unreported results are similar.
- ¹⁹ While we are more interested in the moderation role that each individual characteristic plays in the relation between motivation and financial literacy, we also estimate a model including all interactions, the interactions that are significant individually have smaller coefficients and lower significance levels ($p < 0.05$ at best). However, this result undesirably complicates the reporting and interpretation of the results, and hence is not reported.
- ²⁰ Since van Rooij et al. (2011) 16 financial knowledge questions include basic financial literacy (the first 5 questions) and advanced financial knowledge (the remaining 11 questions), we calculate the proportions of correct answers separately for these two groups of questions and re-estimate the regressions in Table 4. The results, reported in Table A3 in the Appendix A, show that learning motivation contributes more to the model's adjusted R^2 in explaining the variance of advanced financial knowledge than that of basic financial literacy. In addition, while academic seniority, parental education, university type, and extra math study exhibit significant interactions with learning motivation for advanced financial knowledge, only academic seniority matters for basic financial literacy.
- ²¹ <https://viez.vn/hoc-dai-hoc-truong-tu-thi-khong-bang-truong-cong-zpQTHCVWan6C.html>; <https://edu2review.com/reviews/su-khac-nhau-giua-truong-dai-hoc-cong-lap-va-dan-lap-o-viet-nam-749.html>; <https://seoulacademy.edu.vn/nen-chon-truong-cong-hay-truong-tu-de-hoc-tap>.

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APPENDIX A

TABLE A1 Students' characteristics.

	N	%
1. Gender		
Female	478	65.5
Male	252	34.5
2. Academic major		
Accounting	144	19.7
Finance	108	14.8
Business/Marketing/Entrepreneurship	270	37.0
Human Resource	72	9.9
Information Technology	68	9.3
Logistics and Supply Chain Management	45	6.2
Other	23	3.1
3. Academic year		
Year 1	30	4.1
Year 2	292	40.0
Year 3	229	31.4
Year 4 or more	179	24.5
4. University type		
Public universities	487	66.7
Private universities	243	33.3
5. Parental education		
Secondary	216	30.8
High school	230	31.5
University	207	28.4
Master's or more	77	9.3
6. Participation in extra math study		
Never and rarely	96	13.1
Sometimes	122	16.7
Often	288	39.5
Always	224	30.7

Note: This table displays the characteristics of the 730 surveyed students.

APPENDIX B

The following questions are used in our survey to measure students' financial literacy and the components of learning motivation. Note that we do not include the section headings

TABLE A2 Correlation matrix.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Financial knowledge (FLIT)	1						
(2) Learning motivation (LMOV)	0.227 (0.000)						
(3) Male students (MALE)	0.091 (0.014)	0.014 (0.701)					
(4) Academic year (AYR)	-0.124 (0.001)	-0.008 (0.823)	-0.029 (0.427)				
(5) Public universities (PUBLIC)	0.315 (0.000)	-0.072 (0.051)	0.073 (0.050)	-0.321 (0.000)			
(6) Accounting and Finance majors (ACFI)	0.189 (0.000)	-0.051 (0.170)	-0.145 (0.000)	-0.236 (0.000)	0.207 (0.000)		
(7) Parental education (PAEDU)	-0.172 (0.000)	-0.021 (0.569)	0.109 (0.003)	0.026 (0.478)	-0.162 (0.000)	0.047 (0.206)	
(8) Often or always take extra math study (EXSTU)	0.027 (0.473)	0.053 (0.156)	-0.118 (0.001)	0.018 (0.624)	0.054 (0.148)	0.077 (0.037)	-0.051 (0.169)

Note: The numbers in parentheses are *p*-values. Significant correlation coefficients—at least at the 5% level—are in bold.



TABLE A 3 Basic and advanced financial knowledge.

Panel A: Basic financial knowledge		(1)	(2)	(3)	Characteristics		(4)	(5)	(6)	(7)	(8)
				MALE	AYR	ACFI	PUBLIC	PAEDU	EXSTU		
Learning motivation (LMOV)			0.108*** (4.65)	0.114*** (3.88)	−0.029 (−0.45)	0.087** (3.15)	0.159*** (3.90)	0.022 (0.41)	0.194** (2.96)		
Male (MALE)		0.064** (3.17)	0.062** (3.12)	0.127 (0.71)	0.056** (2.80)	0.059** (2.97)	0.062** (3.14)	0.061** (3.05)	0.062** (3.12)		
Academic years (AYR)		−0.023* (−2.32)	−0.021* (−2.16)	−0.021* (−2.08)	−0.202* (−2.48)	−0.023* (−2.30)	−0.019 (−1.93)	−0.020* (−2.04)	−0.021* (−2.16)		
Accounting and finance majors (ACFI)		0.065** (3.26)	0.069*** (3.54)	0.070*** (3.57)	0.062** (3.17)	−0.167 (−0.87)	0.068*** (3.47)	0.067*** (3.47)	0.068*** (3.52)		
Public universities (PUBLIC)		0.126*** (5.70)	0.134*** (6.22)	0.134*** (6.23)	0.129*** (6.00)	0.135*** (6.25)	0.422* (2.27)	0.137*** (6.36)	0.134*** (6.24)		
Parent education (PAEDU)		−0.032*** (−3.33)	−0.030** (−3.23)	−0.030** (−3.22)	−0.029** (−3.08)	−0.031** (−3.26)	−0.031** (−3.26)	−0.174* (−2.09)	−0.030** (−3.17)		
Extra math study during high school (EXSTU)		0.007 (0.78)	0.004 (0.48)	0.004 (0.48)	0.005 (0.52)	0.004 (0.47)	0.005 (0.50)	0.004 (0.40)	0.116 (1.46)		
LMOV × Characteristic				−0.018 (−0.37)	0.049 (2.24)	0.064 (1.25)	−0.078 (−1.56)	0.039 (1.73)	−0.030 (−1.41)		
Intercept		0.586*** (11.67)	0.186 (1.95)	0.161 (1.33)	0.699** (2.83)	0.266* (2.37)	−0.011 (−0.07)	0.496* (2.45)	−0.131 (−0.54)		
Adj. R ²		0.123 730	0.150 730	0.149 730	0.154 730	0.151 730	0.152 730	0.152 730	0.151 730		
N											
Panel B: Advanced financial knowledge				MALE	AYR	ACFI	PUBLIC	PAEDU	EXSTU		
Learning motivation (LMOV)			0.128*** (7.48)	0.114*** (5.20)	0.006 (0.12)	0.144*** (6.89)	0.196*** (6.52)	0.036 (0.97)	0.233*** (4.63)		
Male (MALE)		0.042* (2.50)	0.039* (2.45)	−0.111 (−0.83)	0.034* (2.13)	0.042* (2.57)	0.040* (2.50)	0.038* (2.36)	0.040* (2.47)		

(Continues)



TABLE A 3 (Continued)

Panel B: Advanced financial knowledge	Characteristics							
	MALE	AYR	ACFI	PUBLIC	PAEDU	EXSTU		
Academic years (AYR)	0.011 (1.31)	0.013 (1.67)	0.012 (1.48)	−0.148* (−2.30)	0.014 (1.80)	0.013 (1.65)		
Accounting and finance majors (ACFI)	0.068*** (4.14)	0.073*** (4.53)	0.071*** (4.37)	0.067*** (4.13)	0.255 (1.83)	0.072*** (4.43)	0.073*** (4.51)	
Public universities (PUBLIC)	0.098*** (5.25)	0.107*** (6.12)	0.107*** (6.06)	0.103*** (5.75)	0.107*** (6.09)	0.486*** (3.51)	0.110*** (6.26)	0.108*** (6.15)
Parent education (PAEDU)	−0.031*** (−3.75)	−0.029*** (−3.74)	−0.029*** (−3.75)	−0.028*** (−3.56)	−0.029*** (−3.70)	−0.182*** (−3.78)	−0.028*** (−3.65)	
Extra math study during high school (EXSTU)	0.006 (0.76)	0.002 (0.33)	0.002 (0.33)	0.003 (0.36)	0.003 (0.34)	0.003 (0.35)	0.002 (0.22)	0.139* (2.30)
LMOV × Characteristic			0.041 (1.13)	0.043* (2.53)	−0.050 (−1.32)	−0.102** (−2.77)	0.042** (2.65)	−0.037* (−2.30)
Intercept	0.381*** (8.99)	−0.095 (−1.29)	−0.038 (−0.41)	0.362 (1.87)	−0.158 (−1.77)	−0.354** (−2.94)	0.237 (1.66)	−0.483* (−2.53)
Adj. R ²	0.099 730	0.158 730	0.158 730	0.164 730	0.158 730	0.165 730	0.163 730	0.162 730
N								

Note: The dependent variable in Panel A (B) is the proportion of correct answers to the first five (last 11) questions of the 16-question financial literacy. All independent variables are defined as in Table 3. The numbers in parentheses are robust *t*-statistics.

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

in the questionnaire. Questions about students' other characteristics are not included in here.

B.1. | A/Financial knowledge

1/Suppose you had VND 100 million in a savings account and the interest rate was 2% per year. After 1 year, how much do you think you would have in this account if you left the money to grow?

- i. More than VND 102 million
- ii. Exactly VND 102 million
- iii. Less than VND 102 million
- iv. I do not know

2/Suppose you had VND 100 million in a savings account and the interest rate is 20% per year, and you never withdraw money or interest payments. After 5 years, how much would you have in this account in total?

- i. More than VND 200 million
- ii. Exactly VND 200 million
- iii. Less than VND 200 million
- iv. I do not know

3/Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?

- i. More than today
- ii. Exactly the same
- iii. Less than today
- iv. I do not know

4/Assume Nam inherits VND 10,000 million today and Khoa inherits 10,000 million after 3 years from now. Who is richer because of the inheritance?

- i. Nam
- ii. Khoa
- iii. They are equally rich
- iv. I do not know

5/Suppose that in the year 2030, your income has doubled, and the price of all goods has also doubled. In 2030, how much will you be able to buy with your income?

- i. More than today
- ii. The same
- iii. Less than today
- iv. I do not know



6/Which of the following statements describes the main function of the stock market?

- i. The stock market helps to predict stock earnings
- ii. The stock market results in an increase in the price of stocks
- iii. The stock market brings people who want to buy stocks together with those who want to sell stocks
- iv. None of the above
- v. I do not know

7/If somebody buys the stock of firm B in the stock market:

- i. He owns part of firm B
- ii. He has lent money to firm B
- iii. He is liable for firm B's debts
- iv. None of the above
- v. I do not know

8/If somebody buys a bond of firm B:

- i. He owns a part of firm B
- ii. He has lent money to firm B
- iii. He is liable for firm B's debts
- iv. None of the above
- v. I do not know

9/If the interest rate falls, what should happen to bond prices?

- i. Rise
- ii. Fall
- iii. Stay the same
- iv. None of the above
- v. I do not know

10/Normally, which asset displays the highest fluctuations over time?

- i. Savings accounts
- ii. Bonds
- iii. Stocks
- iv. I do not know

11/Which of the following statements is correct?

- i. Once one invests in a mutual fund, one cannot withdraw the money in the first year
- ii. Mutual funds can invest in several assets, for example, invest in both stocks and bonds
- iii. Mutual funds pay a guaranteed rate of return which depends on their past performance
- iv. None of the above
- v. Do not know

12/Buying a company stock usually provides a safer return than a stock mutual fund.

- i. True
- ii. False
- iii. Do not know

13/Stocks are normally riskier than bonds.

- i. True
- ii. False
- iii. Do not Know

14/Considering a long time period (for example 10 or 20 years), which asset normally gives the highest return?

- i. Savings accounts
- ii. Bonds
- iii. Stocks
- iv. Do not know

15/When an investor spreads his money among different assets, does the risk of losing money:

- i. Increase;
- ii. Decrease;
- iii. Stay the same;
- iv. Do not know.

16/ If you buy a 10-year bond, it means you cannot sell it after 5 years without incurring a major penalty.

- i. True;
- ii. False;
- iii. Do not know.

B.2. | B/Learning motivation

I. Self-efficacy

- 1. Whether the financial content is difficult or easy, I am sure that I can understand it.
- 2. I am not confident about understanding difficult financial concepts. (–)
- 3. I am sure that I can do well on financial tests.
- 4. No matter how much effort I put in, I cannot learn financial courses. (–)
- 5. When financial activities are too difficult, I give up or only do the easy parts. (–)
- 6. During financial activities, I prefer to ask other people for the answer rather than think for myself. (–)

7. When I find the financial content difficult, I do not try to learn it. (—)

II. Active learning strategies

1. When learning new financial concepts, I attempt to understand them.
2. When learning new financial concepts, I connect them to my previous experiences.
3. When I do not understand a financial concept, I find relevant resources that will help me.
4. When I do not understand a financial concept, I would discuss with the teacher or other students to clarify my understanding.
5. During the learning processes, I attempt to make connections between the concepts that I learn.
6. When I make a mistake, I try to find out why.
7. When I meet financial concepts that I do not understand, I still try to learn them.
8. When new financial concepts that I have learned conflict with my previous understanding, I try to understand why.

III. Financial learning value

1. I think that learning financial courses is important because I can use it in my daily life.
2. I think that learning financial courses is important because it stimulates my thinking.
3. In finance, I think that it is important to learn to solve problems.
4. In finance, I think it is important to participate in inquiry activities.
5. It is important to have the opportunity to satisfy my own curiosity when learning financial courses.

IV. Performance goal

1. I participate in financial courses to get a good grade. (—)
2. I participate in financial courses to perform better than other students. (—)
3. I participate in financial courses so that other students think that I am smart. (—)
4. I participate in financial courses so that the teacher pays attention to me. (—)

V. Achievement goals

1. During a financial course, I feel most fulfilled when I attain a good score in a test.
2. I feel most fulfilled when I feel confident about the content in a financial course.
3. During a financial course, I feel most fulfilled when I am able to solve a difficult problem.
4. During a financial course, I feel most fulfilled when the teacher accepts my ideas.
5. During a financial course, I feel most fulfilled when other students accept my ideas.

VI. Learning environment stimulation

1. I am willing to participate in this financial course because the content is exciting and changeable.

2. I am willing to participate in this financial course because the teacher uses a variety of teaching methods.
3. I am willing to participate in this financial course because the teacher does not put a lot of pressure on me.
4. I am willing to participate in this financial course because the teacher pays attention to me.
5. I am willing to participate in this financial course because it is challenging.
6. I am willing to participate in this financial course because the students are involved in discussions.