

ORIGINAL ARTICLE

More Than Knowledge: Consumer Financial Capability and Saving Behavior

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Received: 15 January 2024 | **Revised:** 21 September 2024 | **Accepted:** 29 September 2024

Funding: This work was supported by NTT Data; Observatory of Household and SME Finances; IE Foundation; Fundacion Mutualidad.

Keywords: consumer finance | financial capability | financial knowledge | financial literacy | financial self-confidence | household finance | savings behavior | theory of planned behavior

ABSTRACT

This paper explores the association between financial capability, defined broadly through different constituents, and households' savings behavior. Using a survey conducted to a sample of 1501 consumers, the results, correcting for endogeneity, indicate that in order to explain savings behavior: (i) knowledge about investment products (funds, stocks, bonds, etc.) is more important than knowledge about concepts of an economic-financial nature (simple and compound interest rate, inflation, and diversification); (2) self-confidence in financial knowledge is more relevant than actual financial knowledge; (3) budgeting skills are strongly relevant; and (4) some of the elements proposed by the Theory of Planned Behavior, in particular control or self-efficacy, are valid predictors of savings behavior. In sum, a broad conception of financial capability, beyond financial knowledge, is needed to understand savings behavior. Our study has implications for policy decision makers, consumers, and educational and financial institutions and sheds light on future lines of research.

Jel classification: D14, G51, G53, G50, G41, G40

1 | Introduction

Over the last decades, public pension systems have been strained due to increasing longevity and declining birth rates, highlighting the importance of individuals taking more responsibility for their savings. The financial crisis of 2008 and the health crisis of 2020 further underscored the need for individuals to save, not just to supplement pensions but also to build resilience against economic shocks. As a result, academic research on savings behavior is gaining momentum. Fueled by the increasing complexity of financial markets, one variable has stood out among others in the studies of saving behavior: financial literacy.

Despite extensive analysis and recognition of the importance of financial literacy by the OECD and the European Commission, there is no consensus on its definition and metrics (Ranyard

et al. 2020). As noted by Grable and Rabbani (2020, 12): “While there have been numerous attempts over the years to define and assess financial literacy, there has never really been consensus on the best measurement. In fact, the financial literacy community continues to struggle over what it means to be literate, as well as how to measure literacy.”

This shortcoming arises from its multifaceted nature, encompassing knowledge, attitudes, confidence, habits, and skills (see OECD/INFE 2018, 4) as well as from the broad spectrum of topics that diverse financial behaviors encompass, each requiring an in-depth understanding of distinct concepts like indebtedness, payment management, financial investments, real investments, taxes, and so forth. While all financial behaviors rest on a shared foundation of essential concepts—such as the impact of inflation on the cost of living, the benefits of

[Correction added on 22 September 2025, after first online publication: The copyright line was changed.]

diversification for risk management, and the fundamentals of interest rates—they also require specific knowledge tailored to their unique contexts. For instance, when dealing with indebtedness, understanding the implications of using a collateral asset in a loan, like a mortgage, is crucial; however, knowledge of pension funds is not essential. Conversely, when managing savings for retirement, awareness of pension funds and an understanding of their function as investment vehicles becomes vital.

This challenge has resulted in the body of research lacking uniformity, which limits study comparability but enriches understanding of the construct's constituent elements. Research has uncovered a significant correlation between the different components of individuals' financial literacy, such as knowledge, skills, and confidence, and their financial behaviors. This correlation persists independently of their general level of education.

Based on these considerations, the main objective of our research is to examine the association between financial literacy constituents and households' savings behavior. The novelty is that we propose a holistic approach to financial literacy, based on the dimensions that have emerged in the literature (see Goyal and Kumar 2021). In this context, we conceptualize financial literacy broadly, aligning it with the definition of financial capability outlined by Xiao et al. (2022, 1681), who state, "... financial literacy can narrowly mean financial knowledge or broadly financial capability to make effective decisions." Our paper seeks to examine the factors that influence savings behavior, and as such, we propose a financial capability framework grounded in four key dimensions recognized by various authors and the OECD/INFE as crucial for understanding financial behaviors within the context of financial literacy: (i) objective knowledge, (ii) subjective knowledge or self-confidence, (iii) money management and financial planning skills, and (iv) motivation to engage in behaviors, as established by the Theory of Planned Behavior (TPB). Thus, the first contribution of our paper is to put together these four dimensions to explain savings behavior.

Related to the dimension of knowledge, the literature often defines individuals to be financially literate if they understand three out of four key metrics proposed in the S&P Global FinLit Scale: inflation, diversification, and simple and compound interest (Klapper, Lusardi, and Van Oudheusden 2015). Accordingly, we incorporate this metric into our financial capability framework. However, the use of this arbitrary threshold is debatable and leads to the loss of information (i.e., understanding one concept is not the same as understanding two). To overcome this, we use alternative specifications which assess financial knowledge using a scale that considers the number of concepts understood rather than a binary variable. Moreover, the literature suggests that financial knowledge variables, which usually are based on correct answers to questions with three or four options (correct, do not know, and one or two incorrect) might be upward biased because of the tendency to guess¹ (Van Rooij, Lusardi, and Alessie 2012; Lusardi and Mitchell 2014). In turn, using only the correct answer prevents differentiating between an answer that acknowledges not knowing, and an incorrect answer that implies a higher level of ignorance. On this basis, we explored the detail of the answers (correct, incorrect, and do

not know) in our survey and constructed indices distinguishing between incorrect answers and do not know ones. Therefore, our second contribution pertains to refining the methodology for measuring financial knowledge. While we cannot eliminate all noise in these variables, our aim is to better understand their impact on saving behavior.

Our third contribution, guided by Lusardi and Mitchell (2017), Houts and Knoll (2020), and Fonseca et al. (2012), is to broaden the construct of financial knowledge, from the traditional concepts of interest, diversification, and inflation to the understanding of investment vehicles, such as stocks, bonds, funds, life insurance, and so forth, that are crucial to instrumentalize savings. Understanding the implications of investing in these vehicles in terms of risk, return, liquidity, and taxation can potentially influence households' savings behavior. For instance, Kruger, Grable, and Fallaw (2017) documented that net worth was associated with a good grasp of the risk–return relationship. To this end, we have introduced an additional financial knowledge scale, designed to assess households' specific understanding of investment products, encompassing the risk–return trade-off, as well as taxation and liquidity. While the literature, including Lusardi's extensive work, features comprehensive scales that include questions about concepts related to investment products, that we will review and discuss later, we have not yet identified one that encompasses all the elements we consider essential for a thorough understanding of the investment vehicles used by households to manage their savings.

Hauff et al. (2020, 546) claimed that "An accurate perception of one's knowledge is essential for being self-confident in applying the objective knowledge." Some researchers found evidence of the role played by self-confidence in financial decision making (Asaad 2015; Allgood and Walstad 2016; Anderson, Baker, and Robinson 2017; Vörös et al. 2021). Our fourth contribution is based on this insight. We first examine the association between savings behavior and self-confidence, proxied by perceived knowledge, and subsequently explore whether the association between objective financial knowledge and savings behavior differs according to the level of self-confidence (arguable linked to personal traits). Perceived knowledge has been previously employed as a metric of financial confidence by Asaad (2015), Lusardi and Mitchell (2017), Bannier and Schwarz (2018), among others.

As an additional contribution and following Huston (2010) and Remund (2010), we expand the construct of financial capability by including financial management skills and motivation, which are hardly covered in the literature. With some exceptions, financial literacy studies rarely mention money management skills. As stated by French and McKillop (2016, 2) "Assessment of money management skills has been confined to a literature focusing on the psychological determinants of debt." In contrast, financial advisors consider these skills a necessary element for successfully managing personal finances and achieving savings goals. This is evident in the proliferation of budgeting apps created by fintech companies and commercial banks.² We utilize the self-reported scale developed by White et al. (2021), which focuses on budgeting and tracking bank statements, as a measure of financial management skills. Regarding motivation, we draw upon the "TPB" (Ajzen 1991). This theory posits that behavior is

influenced by: (i) attitude (whether the individual is in favor of engaging in the behavior); (ii) the subjective norm (whether the individual perceives to have social pressure to perform the behavior); (iii) perceived control (whether the individual feels to have the control or ability to perform the behavior). To this end, we adapt the measurement instruments employed by Shim, Serido, and Tang (2012) in the context of savings and Xiao et al. (2011) in the context of credit.

We use logistic regressions to study how the financial capability constituents affect household saving behavior, while also considering socio-economic and demographics factors. We address potential endogeneity of financial knowledge and savings behavior with alternative specifications.

This paper is organized as follows: Section 2 reviews literature on financial literacy and savings behavior, introducing the conceptual framework used for our model; Methodology is addressed in Section 3, including measures of the financial capability constituents and econometric models; Section 4 reports the analysis and results, including the robustness tests. Section 5 discusses findings and implications, while Section 6 concludes and outlines the limitations of the research, suggesting future research directions.

2 | Theoretical Background

2.1 | Financial Capability: Towards a Holistic Approach to Financial Literacy

Huston (2010) stated that almost three quarters of the 71 studies she reviewed lacked a definition of financial literacy and half of them used the terms financial literacy and financial knowledge interchangeably. Indeed, the bulk of the literature relies on a limited concept of financial literacy as pointed out by Warmath and Zimmerman (2019, 1): “Unfortunately, in most cases, this potentially rich construct [the authors refer to financial literacy] is reduced to mere financial knowledge. This myopic conceptualization hampers the development of the concept and programs to build financial literacy.” In this paper, we adhere to the definition of financial capability provided by Xiao et al. (2022), which aligns with a broad conception of financial literacy.

We present below a brief literature review of the four dimensions of our financial capability construct, knowledge, confidence, money management skills and motivation. Our first hypothesis is that these four dimensions of financial capability would drive household savings behavior:

H1. *There is a direct relationship between the dimensions of knowledge, confidence, money management skills and motivation and savings behavior.*

a. Financial knowledge

The usual approach in the mainstream literature, based on the Standard & Poor’s Ratings Services Global Financial Literacy Survey (see Lusardi and Mitchell 2014), assumes that

individuals are financially literate when they understand at least three out of four key economic-financial concepts: simple and compound interest rates, inflation, and the impact of diversification on risk reduction. Variation of these questions, known as the “Big Three,” and the “Big Five” were incorporated into the 2009 National Financial Capability Study (NFCS) in the US (Hastings, Madrian, and Skimmyhorn 2013). As noted by Hauff et al. (2020, 544), “for almost two decades, studies have largely relied on a measure of financial literacy consisting of the same limited set of three to five standard survey questions.”

Some authors have broadened the scope of financial knowledge to encompass markets and investment products, yet studies vary significantly in the metrics used based on their objectives. For instance, Lusardi and Mitchell (2017, 8) included eight questions about market functioning and investment products, while Fonseca et al. (2012) considered 23 items in their financial literacy index, including knowledge about mutual funds, bonds, stocks, and life-savings insurance. Houts and Knoll (2020) condensed their previous 20-item scale into a 10-item, including questions pertaining to mortgages and real estate investments. Behrman et al. (2012) crafted questions to measure key aspects of the Chilean retirement system, such as the mandatory contribution rate, retirement ages, and pensions benefits estimation methods.

However, none of these scales includes all the elements that we deem essential for comprehending household investment products. The scale developed by Lusardi and Mitchell (2007, 2017)³ includes questions designed to explore key characteristics of significant investment assets, such as mutual funds, stocks, and bonds. However, it fails to consider commonly used investment vehicles in household portfolios, such as pension funds and life insurance, and does not address crucial factors for selecting investment products, including taxation and liquidity. Fonseca et al. (2012) built upon Lusardi and Mitchell’s (2007) expanded scale by adding four questions related to life insurance, drawn from the FINRA Investor Survey, which partially addresses our concerns. However, pension funds, as well as the aspects of liquidity and taxation remain unexplored. Knoll and Houts (2012) included three questions about life insurance and two questions about retirement investment, but unfortunately, these questions are framed within the US specific context (e.g., 401(k) plans’ rules) and cannot be easily replicated in other regions. To overcome this concern, we create a novel scale to measure households’ knowledge of investment products. As detailed in Appendix 3, the reliability and convergent validity of this scale are considered appropriate.⁴

Building upon the preceding discussion, our second hypothesis examines whether active knowledge of financial concepts and investment products influences savings behavior, while also controlling for endogeneity.

H2a. *There is a direct relationship between knowledge of financial concepts and savings behavior.*

H2b. *There is a direct relationship between knowledge of investment products and savings behavior.*

b. Self-confidence

The literature has enlarged financial literacy by also considering self-confidence, finding it is at least as relevant as actual knowledge to explain financial behaviors. This construct has been assessed using self-assessed questions about perceived knowledge by Asaad (2015), Lusardi and Mitchell (2017), Bannier and Schwarz (2018), among others. However, due to their intricate relationship, there is some ambiguity in the literature between the constructs of self-confidence and self-efficacy. Lown et al. (2015, 492) and Furrebøe & Nyhus (2022, 756) stated that self-efficacy is task specific. The latter authors go further clarifying that self-efficacy relates to the notion of control as described by the TPB (Ajzen 1991), while self-confidence embodies a general force of belief. Recently, Białowolski et al. (2021, 6) also acknowledged this confusion, advocating for the use of perceived knowledge as a proxy for self-confidence. Our interpretation of both constructs aligns with that of these authors.

The approaches used to measure financial confidence have been varied: (i) from estimating it as the precision respondents feel about their answers to objective financial knowledge questions; (ii) to the perception of respondents about their own financial knowledge on the basis of a direct question about it; (iii) or by inferring how the respondents perceive their knowledge relative to the rest of the population. Despite this disparity of measurement criteria, research suggests that both actual and perceived knowledge are crucial in explaining various financial behaviors (Asaad 2015; Allgood and Walstad 2013, 2016). Some authors explored the interactions between both variables. For instance, Allgood and Walstad (2016) noted that about a quarter of the individuals in their sample were underconfident while around 16% were overconfident. In this vein, Asaad (2015) showed that overconfident individuals had a higher propensity to engage in risky financial behaviors. On the contrary, Vörös et al. (2021) provided evidence that overconfidence was positively linked to financial health and well-being. Anderson, Baker, and Robinson (2017) found that precautionary savings and retirement planning correlated positively with financial literacy, and that this correlation was equally driven by actual knowledge and misconceived perceptions of one's financial knowledge. These findings underscore the importance of self-confidence and the interplay between financial confidence and actual knowledge.

In this line our third hypothesis explores the influence of self-confidence in savings behavior.

H3a. *There is a direct relationship between self-confidence on financial concepts understanding and savings behavior.*

H3b. *There is a direct relationship between self-confidence on investment products understanding and savings behavior.*

H3c. *Actual and perceived knowledge of financial concepts interact in the sense that there is a trade-off between both when it comes to explain savings behavior.*

H3d. *Actual and perceived knowledge of investment products interact in the sense that there is a trade-off between both when it comes to explain savings behavior.*

c. Financial management skills or abilities

The literature also points out that financial management abilities or skills condition financial behaviors. Huston (2010, 307) argued that “Financial literacy has an additional application dimension [beyond knowledge] which implies that an individual must have the ability and confidence to use his/her financial knowledge to make financial decisions.”

For the most part of the literature, financial management skill, is confined to studies about credit and loans decisions. For instance, French and McKillop (2016), Hamid and Loke (2020), and Gardarsdóttir and Dittmar (2012) found that increased debt levels can be partially attributed to deficiencies in money management abilities (among which budgeting is included). White et al. (2021) proposed a Structural Equation Model to investigate the sequential relationship among objective financial knowledge, money management skills, and financial self-efficacy, while excluding any financial behaviors beyond the money management skills they define, namely budgeting and tracking expenses and transactions. Surprisingly, budgeting has rarely been explored as a determinant of savings behavior. French and McKillop (2016) discuss its impact on net worth, while Xiao and O'Neill (2018) establish a positive association between budgeting and desirable financial behaviors, such as saving for emergencies and estimating retirement needs. They also note that budgeting is particularly beneficial for individuals with limited resources, positioning it at the lower end of the behavioral hierarchy. Additionally, McLellan (2012) emphasizes the significance of budgeting in financial education programs and financial planning practices. In this vein, Preuße (2012) presents a conceptual design of reference budgets for German households to be used for counseling purposes.

Even though the measurement of money management skill varies in the literature, most studies include self-assessed questions about budgeting, bill payments management, and income and expenses monitoring. For instance, White et al. (2021) measured financial management skills through self-reported variables related to budgeting and tracking expenses and transactions. We incorporate their metric into our study to address the money management skills dimension of financial capability.

Accordingly, we establish our fourth hypothesis.

H4. *There is a relationship between money management skills proxied by financial planning and savings behavior; and this relationship is kept for basic (monitoring bank statements) and sophisticated financial planning (budgeting).*

H4a. *There is a direct relationship between monitoring bank statements and savings behavior.*

H4b. *There is a direct relationship between budgeting and savings behavior.*

d. Motivation

Remund (2010, 288) added motivation to the financial literacy construct: “... to be financially literate requires knowledge, skills, motivation and confidence.” The primary framework utilized to operationalize motivation for behavior has been the TPB by Ajzen (1991). This theory posits that an individual's intention to

engage in a behavior is influenced by attitude towards the behavior, subjective norm, and self-efficacy. This theory has been previously applied to explain different financial behaviors such as debt management (Xiao and Wu 2008) and credit behavior among college students (Xiao et al. 2011). Regarding saving, Shim, Serido, and Tang (2012) applied this behavioral theory to explore young adults' saving behavior and subsequent financial well-being, finding a positive influence of all three elements of the TPB in saving, and through it, in financial well-being. Similarly, Lown et al. (2015) studied the impact of one of its constituents (self-efficacy) on savings behavior, also finding a positive effect.

In line with these premises, we propose our fifth hypothesis, which examines the three components of the TPB using standardized questions within the context of savings behavior.

H5a. *There is a direct relationship between attitude towards savings and savings behavior.*

H5b. *There is a direct relationship between subjective norms related to savings and savings behavior.*

H5c. *There is a direct relationship between self-efficacy related to savings and savings behavior.*

2.1.1 | Addressing Measurement Errors in Financial Literacy Research

The literature review on financial literacy is incomplete without acknowledging measurement errors linked to commonly used variables. Studies suggest that interviewer effects notably impact the variance in financial literacy scores (Crossley et al. 2021), while the wording of questions influences respondents' answers, and that women are more inclined to respond with "do not know" (Lusardi and Mitchell 2014). While the latter was attributed to women's awareness of their knowledge gaps, recent findings suggest there is a measurement error in men's answers. Nuñez-Letamendia, Sanchez-Ruiz, and Silva (2022) demonstrated that men had a higher proportion of both correct and incorrect answers, implying they might guess answers more frequently. Gignac and Ooi (2021) emphasized that measures of financial knowledge often rely on composite scores derived from multiple items, lacking the minimum internal consistency required by psychometric standards (typically assessed by Cronbach's alpha). The study evaluated the internal consistency of studies using the "Big Three" and "Big Five" financial knowledge questions, revealing Cronbach's alpha values ranging from 0.30 to 0.60 (below the 0.70 and 0.80 minimum required for exploratory and basic research, respectively). The authors emphasized the significance of internal consistency in ensuring test score reliability and effect size estimation confidence. Despite its importance, internal consistency has often been disregarded in the literature.

2.2 | Background on Savings Research

The study of savings traces back to John Maynard Keynes, who proposed a positive relationship between savings and income in his seminal work, "General Theory of Occupation, Interest, and Money" (Keynes 1936). Nobel laureate Simon

Kuznets questioned the income-consumption relationship in 1942 (Kuznets 1942). This led to alternative theories such as the lifecycle and the permanent income theories by Modigliani and Brumberg (1954) and Friedman (1957), respectively. These theories propose that individuals manage consumption and savings over their lifetimes to secure future economic well-being. Subsequent contributions introduced factors such as precautionary and bequest motives for saving, with authors such as Leland (1968), Yaari (1964), Meade (1966), Tobin (1967), and Atkinson (1971) exploring these aspects. More recently, empirical research on savings has expanded including gender, personality traits, and institutional context, among others, as explanatory variables.

Recent literature has also shed light on how different aspects of financial literacy are linked to saving and investment behaviors. For instance, it has been observed that individuals with higher financial literacy plan better for retirement (Lusardi and Mitchell 2006), are more prone to participate in the stock market by holding stocks or mutual funds (Van Rooij, Lusardi, and Alessie 2011), hold a higher share of investment in stocks (Balloch, Nicolae, and Philip 2015), accumulate greater wealth in terms of pension savings, net housing or others (Behrman et al. 2012), have greater financial and durable asset accumulation (Koomson, Villano, and Hadley 2023), and have investments that are more profitable (Von Gaudecker 2015; Deuflhard, Georganakos, and Inderst 2019).

2.3 | Endogeneity Concerns

Causality remains unclear in regression-based studies utilizing financial literacy components to explain saving behavior. For instance, Lusardi and Mitchell (2006) reported that higher financial literacy was associated with better saving for retirement, and De Bassa Scheresberg (2013) found a positive association between financial literacy and precautionary saving behavior, but endogeneity was not examined. Similarly, Gill and Bhattacharya (2017) suggested a positive association between financial knowledge and savings related to three goals (precautionary motives, children's education, and retirement plans), but they recognized the difficulties in establishing the causality, as they did not find exogenous instrumental variables to correct for potential endogeneity (p. 508).

Building upon this notion, Monticone (2010) delved into the relationship between wealth accumulation, used as an indicator of the ability to save, and financial literacy, carefully addressing endogeneity concerns through instrumental variables. Interestingly, the study uncovered a minor reverse causality effect, suggesting that the influence of wealth accumulation on financial literacy was quite residual and might be related to the long-term nature of savings and wealth accumulation. This effect does not rule out a direct causality effect of financial literacy on saving behavior, it just makes it more difficult to isolate its magnitude, as endogeneity problems are always difficult to solve.

Literature reviews conducted by Lusardi and Mitchell (2014) and Fernandes, Lynch Jr., and Netemeyer (2014) include some studies that correct for endogeneity, typically using instrumental

variables. Surprisingly, the first authors reported that, on an aggregate basis, instrumental variable estimates were larger than those of OLS, while the second authors found smaller effects for studies using instrumental variables. In short, the literature has found a positive impact of financial literacy constituents on various financial behaviors, including retirement planning and saving, regardless of whether this impact is biased upwards or downwards, due to endogeneity problems. In their study tackling endogeneity, Lusardi and Mitchell (2007) discovered that retirement planning was affected by financial literacy. To address endogeneity, they utilized an instrument based on a survey question about the level of economic education received in school, serving as a proxy for financial literacy and free from endogeneity concerns. The effect of financial literacy reported correcting for endogeneity was seven times larger than with OLS. In turn, Van Rooij, Lusardi, and Alessie (2012) after controlling for endogeneity, found that financial literacy does influence individuals' net wealth. They employed the same instrument as Lusardi and Mitchell (2007) and a large battery of control variables.

Subsequently, Jappelli and Padula (2013) presented an intertemporal consumption model of investment in financial literacy which empirically validated the level of financial literacy early in life as an instrument in the regressions of savings and wealth on financial literacy. The authors show there is a strong effect of financial literacy on savings and wealth and that OLS regressions underestimate these effects.

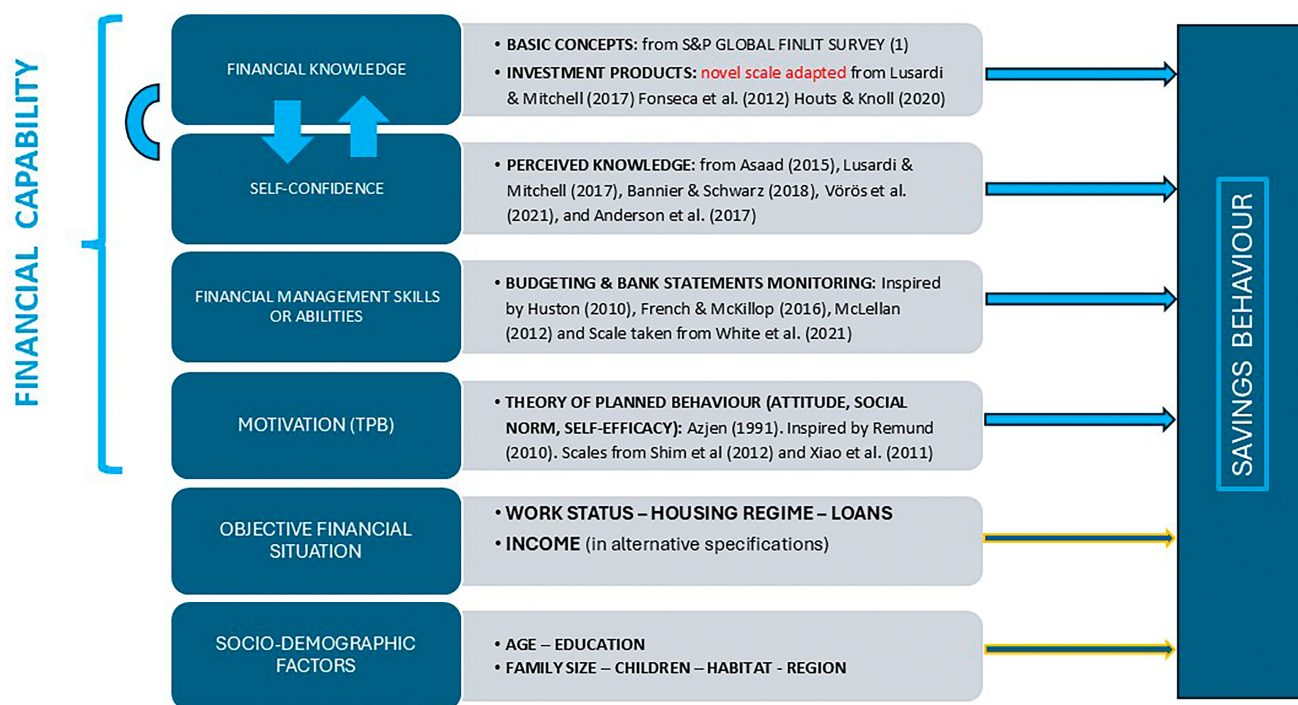
In a recent study, Deuflhard, Georgarakos, and Inderst (2019) found that financial literacy influences the return earned on savings accounts, despite the simplicity of the investment product.

Although the nature of the dependent variable (savings account returns) limits the possibility of endogeneity, the authors performed several approaches to address it. After correcting for endogeneity, regardless of the instrumental variable used, the relationship between financial literacy and saving account return was stronger.

2.4 | Conceptual Framework

This research specifically explores the role played by four financial capability constituents in explaining household savings. Rather than developing a single index or scale of financial capability by combining the indicators from the four dimensions considered, we adopt a multifaceted approach. We keep the components and their associated indicators distinct, as our research aims to explore how these different aspects of financial literacy influence household saving behavior. We believe this approach provides more nuanced insights into the particular areas of financial education that need greater focus to effectively encourage households to save.

The conceptualization and operationalization of financial capability that we propose is informed by the methodological framework described by Lučić, Barbić, and Uzelac (2023) and the previous discussion of the literature. Lučić, Barbić, and Uzelac (2023) distinguish between three different antecedents influencing financial decisions: (i) socio-demographic factors; (ii) cognitive and affective factors (including money management skills, attitude, social norms and self-efficacy); (iii) and personality and values (among which they included self-confidence). Figure 1 illustrates our conceptual framework.



(1) S&P Global FinLit Survey | Global Financial Literacy Excellence Center (GFLEC)

FIGURE 1 | Conceptual framework.

3 | Data and Methodology

3.1 | Data Source, Sample, and Variable Measurements

Data used in this research originates from a survey designed by the authors for the Household Savings Observatory (currently Observatory of Finances for Households and SMEs). The survey design was informed by an extensive review of the existing literature on financial literacy and behaviors. The survey was administered online in March 2021 by Netquest,⁵ a market research firm. To select the sample, Netquest conducted stratified random sampling with respect to the variables for which the sample is representative. A final sample of 1501 individuals was obtained with appropriate proportionality criteria so that it was representative of the Spanish population with internet access (94% of the total⁶) by gender, age, socio-economic status and geographical area. Appendix 1 presents the descriptive statistics including the frequencies of the sample compared to those of the Spanish population in 2021 for the representative variables.

The response rate was 69% and the margin of error was 2.5% for a confidence level of 95%. Some of the questions were addressed to the household, while others referred to the respondent.

The survey provides information about households' and individuals' socioeconomic and demographic variables: gender, age, geographic area, habitat size, education, employment profile, income level, socio-economic status, number of children under the age of 15, members of the family unit, housing regime (rented or owned), whether the family unit has a mortgage or other kind of personal loan, and position of the respondent in the family unit. The survey includes sections with questions aimed at gauging the financial literacy of the respondent and household savings habits.

For the variables in our survey, item non-response is not a problem, as there are no missing values in our dataset, except for the variable "personal loan," which has a missing data rate of 3.7%, and for the variable "household income," which has 25.7% missing values, so the latter is not used in the main analyses, but only in a robustness test.

3.1.1 | Dependent Variable

Our dependent variable is a binary measure, adapted from Lown et al. (2015) indicating whether the household reported saving any money during the 2 years preceding the onset of the Covid-19 pandemic.⁷ The survey categorizes savers into four brackets based on the percentage of their disposable income allocated to savings.⁸ However, 84% of saving households fall into the lower two brackets. Hence, it is more suitable to treat savings as a binary variable rather than using the disposable scale.

3.1.2 | Explanatory Variables

3.1.2.1 | Constituents of the Financial Capability Construct.

Based on the literature discussion our research

not only examines traditional financial knowledge but also delves into understanding investment vehicles, crucial for managing household savings. Furthermore, as outlined in Figure 1, we assess additional facets of financial capability, such as self-confidence, skills or abilities, and motivations or beliefs.

The wording of the questions used for the different scales of financial capability constituents and the calibration of the answers can be found in Appendix 2 and Tables 5 and 6.

Except for financial literacy of investment products, all the measures we use for financial capability constituents are taken and adapted from previous studies, as highlighted in Figure 1 and subsequently in the description of each variable. In the absence of a validated scale instrument tailored to assess the knowledge of investment products available to households we propose a novel scale.

Establishing the internal consistency of the scales we use, particularly of the new one we propose, is a necessary step in the validation of the constructs and it involves quantifying the correlation between the items that make up the construct (Tavakol and Dennick 2011; Nunnally and Bernstein 1994). Unfortunately, it is not a generalized practice in financial literacy studies (Gignac and Ooi 2021). We use the prevalent methods for assessing internal consistency which are Cronbach's alpha and Composite Reliability (CR). Values above 0.80 and 0.70 respectively are generally regarded as indicative of good internal consistency (Cheung et al. 2023; Gignac and Ooi 2021). In the same way, it is important to establish the validity of the variables used to approximate the constructs. To assess convergent validity, we consider the average variance extracted (AVE) for which a value over 0.5 is widely recommended. Finally, to assess divergent validity, we check that the correlations between constructs are less than 0.8 (Rönkkö and Cho 2022). Additionally, we compute the Fornell-Larcker criterion (Fornell and Larcker 1981) which stipulates that the square root of each construct's AVE should exceed the correlation between constructs. The tables and analyses resulting from the tests of reliability, and convergent and divergent validity are presented in Appendix 3. Although the reliability of the scale of actual knowledge of traditional financial concepts is lower than desirable, as well as the divergent validity between this scale and the one we propose for actual knowledge of investment products, overall, we consider that the reported results do not preclude their use in the study.

a. Actual Knowledge

- Objective knowledge of financial concepts (OFK). We asked about the four topics questioned in the S&P Global Finlit Survey (Klapper, Lusardi, and Van Oudheusden 2015)⁹ related to simple and compound interest, inflation and diversification to create the dichotomous variable OFK. The variable equals 1 if the respondent answers correctly at least 3 out of the 4 topics; and 0 otherwise. Appendix 2 presents the wording of the questions. This is the scale that raises the most concerns regarding reliability, convergent validity, and divergent validity, as evidenced by the data reported in Appendix 3. Nevertheless, its inclusion as a component of

the financial literacy construct is justified by its extensive usage in existing literature.

- Objective knowledge of investment products (OKIP). We did not find a valid scale in the literature to assess the level of knowledge of investment products (as discussed in previous Section 2.1 (a)). Therefore, we propose a new scale for this purpose, based on a thorough review of relevant literature and the framework governing financial investment in Spanish households. We examined the Bank of Spain Household Financial Survey, which indicates that the main investment products used by Spanish households are mutual funds, pension funds, stocks, and life-savings insurance. Conversely, fixed income products are used on a minimal basis. However, we also included this latter product in our questionnaire as the literature typically included it. In our discussions with practitioners, we identified key characteristics used to distinguish these investment products, such as return, risk, liquidity, and taxation. In parallel, our approach involved examining existing scales utilized in the literature pertaining to market functioning and investment products. Lusardi and Mitchell (2007, 2017) focused on eight financial questions related to markets and investment products but did not include pension funds and life insurances. Fonseca et al. (2012) built on Lusardi and Mitchell (2007) including four questions about life insurance, but no one about pensions funds, or liquidity and taxation implications. Knoll and Houts (2012) scale included some questions on life insurance and retirement funds within the context of US (e.g., 401-K plan) which hinders its replicability for other regions.

To streamline the survey process and alleviate the burden on respondents, and drawing inspiration from the aforementioned premises, we included four questions designed to assess the comparative levels of expected return, risk, liquidity, and taxation across five investment products (mutual funds, pension funds, stocks, bonds, and life insurance). Appendix 2 presents the questions.

As detailed in Appendix 3, the reliability and convergent validity of this scale are considered appropriate. While there are reservations about the divergent validity nearing a threshold, the scale's comprehensive coverage of investment product knowledge compensates for this limitation, effectively encompassing the construct's scope.

We then created a dichotomous variable, OKIP, which equals 1 if the respondent correctly assigns at least 2 out of the 4 characteristics for 3 out of the 5 investment products; and 0 otherwise.

a.1: Robustness Test With Alternative Specifications of These Variables

As the use of threshold levels is arbitrary and limits the richness and granularity of the information available, we use alternative specifications for the objective knowledge variables, based on the number of concepts and products understood by the respondent (OFK_I and OKIP_I, respectively). For OFK_I, the scoring range extends from 0 to 4, representing the

number of concepts answered correctly out of four. Similarly, for OKIP_I, the scoring range spans from 0 to 20, reflecting the number of correct responses across the four characteristics for each of the five investment products. This approach allows for a more nuanced and comprehensive assessment of respondents' understanding.

In addition, in a supplementary model, we split the knowledge of financial concepts into its four components (OFK_DIV for diversification; OFK_INF for inflation; OFK_IR for simple interest rate; and OFK_CIR for compound interest rate). This way, we can overcome the low internal reliability of basic financial knowledge while observing whether some financial concepts are more relevant than others in explaining savings behavior.

We further explore alternative specifications that distinguish between incorrect and do not know answers (assuming that incorrect answers denote a higher level of ignorance than an acknowledgment of not knowing).

b. Self-confidence

Based on the literature—Asaad (2015), Lusardi and Mitchell (2017), and Bannier and Schwarz (2018)—we proxy this construct through self-assessed financial knowledge questions about the concepts and investment products covered.

- The variable SFK (self-confidence on basic financial knowledge) measures perceived knowledge in three domains, mathematics (or numeracy), economics, and finance, using a 5-point Likert scale.

If respondents perceive they have at least basic knowledge (score of 2 or higher) in all three queried areas, our binary variable takes the value of 1; and 0 otherwise. This scale demonstrated a good level of reliability and convergent and divergent validity.

- The variable SKIP (self-confidence on investment products knowledge) measures perceived knowledge regarding pensions funds, mutual funds, stocks, bonds and life-saving insurances. This assessment uses a 5-point Likert scale. We created a dichotomous variable: SKIP = 1, if the respondents consider they have basic knowledge (score of 2 or higher) about the 5 products asked; and 0 otherwise. This scale exhibited an outstanding level of reliability and convergent and divergent validity

b.1: Robustness Test With Alternative Specifications for the Self-Confidence Variables

In alternative specifications, we measure knowledge perception of financial concepts and investment products using a scale index instead of binary variables. Additionally, the survey includes a question about self-assessed knowledge of investment products (without reference to any specific one) based on a 5-point Likert scale. We use this variable in a supplementary model as a proxy for self-confidence related to investment products.

c. Financial Management Skills Or Abilities

- We use the questions of White et al. (2021), to measure financial management skills though self-reported variables

related to budgeting and tracking expenses. Therefore, we use a nominal variable (sPLAN) with three groups depending on whether the household does not carry out any financial planning/budgeting process; restricts it to the monitoring of bank statements; or forecasts a financial plan/budget for forthcoming periods. We designate the first group as the reference category.

d. Motivation

Lastly, in exploring motivations to save, we drew upon Ajzen's (1991) TPB and adapted measurements employed by Shim, Serido, and Tang (2012) in the context of savings and Xiao et al. (2011) in the context of credit. Consequently, we devised three ordinal variables on a scale of 1–5 points, with higher scores indicating stronger agreement with the statements.

- Savings attitude (sATT) is based on the respondent answers to: "Periodic savings is desirable and would improve the future financial situation for me and my family."
- Savings subjective norm (sENV) is based on the mean score of the following statements: "People important to me think that I should save periodically"; "People in my environment with a similar profile to mine save periodically."
- Feeling of control over one's savings (sCONT) is based on the mean of the following statements: "I believe that I am able to save (according to my income) with an adequate frequency"; "I believe I am able to make appropriate decisions about my savings."

Next, we examine two sets of control variables identified in the literature as potential influencers of savings behavior: household demographics and objective financial situation.

3.1.2.2 | Demographic Control Variables. We include the following demographic control variables: age, education level, number of children under 15, family size, geographical region, and habitat size.

- Age of the respondent, centered on the mean¹⁰ (AGE). According to the life cycle theory, the relationship between savings and age is non-linear (Modigliani and Brumberg 1954). Therefore, we will also consider the square of the age of the household head (SAGE) and its cube (CAGE).
- Educational level of the respondent (EDU): This is an ordinal variable with five groups (primary school, high school, medium-level professional qualifications/Baccalaureate, high-level professional qualifications, college). Higher scores are coded as higher educational level.
- Number of children under 15 years old in the household (CHILD). Households with children are anticipated to incur significant expenses associated with caregiving, potentially leading to diminished opportunities for saving.
- Family size (SIZE): This represents the number of cohabitants (family members) in the household.

- Regional areas (ZONE): The Spanish territory is divided in regions that enjoy a certain degree of government autonomy and have institutional differences that may affect citizens' savings behavior (e.g., differences in taxation on issues such as inheritances or donations, etc.). For this reason, we control for the geographical region of the household by using a nominal variable with nine regional areas.
- Type of habitat (HABITAT): This is a nominal variable with three groups depending on whether the household resides in a provincial capital, a non-capital city of 50,000 or more inhabitants, or a non-capital under 50,000 inhabitants. Larger towns and cities offer better access to financial services and institutions, potentially impacting savings behavior.

3.1.2.3 | Objective Financial Situation Control Variables Related to Household. We proxy for it using three variables: work status, housing regime, and personal loans. Our survey collected information about household income, but many of the respondents did not answer. For this reason, we do not include it in the main specification, although we do in robustness tests (INCOME).

- Work status (WORK): This is a nominal variable with three groups depending on whether the respondent receives a salary, a pension or has no income (employed/self-employed; retired/pensioner/disabled; unemployed/student/housewife or househusband), with the first group serving as the reference.
- Housing regime (HOUSE): This variable is nominal with four groups depending on whether the family home is owned without mortgage, with a mortgage, the family lives in a rented house, or other unique situations, with the first group serving as the reference.
- Personal loan (LOAN)=This variable takes the value of 1 if the household is currently paying for a loan, and zero otherwise.

3.2 | The Analytic Model

As our dependent variable (household saving behavior) is binary, we employ a logistic regression model. We incorporate explanatory variables outlined in Section 3.1 based on theoretical criteria discussed in the literature review. In addition, we include interactions between objective financial knowledge variables and self-confidence variables (perceived financial knowledge).

Model:

$$\begin{aligned} \text{logit}(\text{savings} = 1) = & \beta_0 + \beta_1(\text{AGE}) + \beta_2(\text{SAGE}) + \beta_3(\text{CAGE}) \\ & + \beta_4(\text{EDU}) + \beta_5(\text{CHILD}) + \beta_6(\text{SIZE}) + \beta_7(\text{ZONE}) \\ & + \beta_8(\text{HABITAT}) + \beta_9(\text{WORK}) + \beta_{10}(\text{HOUSE}) \\ & + \beta_{11}(\text{LOAN}) + \beta_{12}(\text{SFK}) + \beta_{13}(\text{OFK}) + \beta_{14}(\text{SKIP}) \\ & + \beta_{15}(\text{OKIP}) + \beta_{16}(\text{SFK} * \text{OFK}) + \beta_{17}(\text{SKIP} * \text{OKIP}) \\ & + \beta_{18}(\text{sPLAN}) + \beta_{19}(\text{sATT}) + \beta_{20}(\text{sENV}) + \beta_{21}(\text{sCONT}) \end{aligned}$$

We proceed by conducting regressions with only socio-demographic control variables initially. Next, we add the variables measuring objective financial situation. Subsequently, we include the explanatory variables related to the constituents of financial capability one by one. This approach allows us to observe the individual additional influence of each variable in the model. The analyses were made with the statistical software SPSS v.26, STATA v.18, and Mplus v.8.

4 | Results

4.1 | Descriptive Characteristics of the Sample

Appendix 1 presents descriptive statistics of the dependent variable and socio-economic and demographic controls. In this section, Tables 1–6 show descriptive statistics of the financial capability constituents.

Approximately half of the respondents (51%) are female,¹¹ with nearly 40% falling between the ages of 35 and 54. Regarding education, 85% have attained more than compulsory high school. About 73% of the households have up to three members cohabiting, and roughly 30% have one child under 15 years old. Moreover, over 60% of the sample reside in cities with more than 50,000 inhabitants.

Regarding economic situation, half of the sample is employed (either as an employee or self-employed), while the other half is not working (22% retired, and 28% housewives/househusbands, students or unemployed). Almost 73% of the households interviewed are living in their own homes, with 29% of the sample still paying the mortgage. In addition, 25% of the sample had a personal loan. As for income, about 26% of the sample did not provide an answer. Among those who did, 44% reported less than €20K of annual income, while only 5.5%

TABLE 1 | Knowledge.

Knowledge of concepts	Correct	Incorrect	Do not know
Diversification	59.56	5.20	35.24
Inflation	67.09	17.79	15.12
Simple interest	65.96	12.86	21.19
Compound interest	55.16	22.52	22.32
Knowledge of investment products ^a	Correct	Incorrect	Do not know
Mutual funds	39.44	24.64	35.93
Pension funds	27.48	32.20	40.33
Life-savings insurance	33.54	31.45	35.01
Stocks	25.69	33.35	40.98
Bonds/fixed income	26.43	34.34	39.22

Note: Patterns of responses to questions on concepts and investment products (%).

^aPercentages reported for correct, incorrect, and “do not know” answers of investment products, refer to the *means* of the frequencies obtained across the four characteristics addressed (expected return, risk, liquidity, and taxation) by the survey respondents. Detailed descriptive statistics for these characteristics are shown in Appendix 4.

TABLE 2 | Confidence.

Perceived basic knowledge	1—No	2—Basic	3—Aver	4—High	5—Very H	Basic + ^a	Aver. + ^b
Maths	5.80	32.91	42.04	15.66	3.60	94.21	61.30
Economy	16.59	47.50	28.38	6.33	1.20	83.41	35.91
Finance	27.38	43.64	21.39	6.00	1.60	72.63	28.99
Investment products	39.84	36.38	17.39	5.13	1.27	60.17	23.79
Mutual funds	50.77	26.58	15.72	5.53	1.40	49.23	22.65
Pension funds	44.77	27.45	19.65	6.80	1.33	55.23	27.78
Life-saving insurance	48.97	26.72	17.85	5.33	1.13	51.03	24.31
Stocks	59.56	18.65	14.12	5.80	1.87	40.44	21.79
Bonds/fixed income	57.56	20.99	14.32	5.86	1.27	42.44	21.45

Note: Patterns of responses to perceived knowledge of concepts and investment products (%).

^aPerceived knowledge is basic or higher than basic.

^bPerceived knowledge is average or higher than average.

reported incomes exceeding €60k, with the remaining 50% falling in between.

In terms of savings, about 36% of the sample reported not having saved money during the 2 years prior to Covid-19, while almost 64% indicated that they did.

Table 1 displays statistical data revealing participants' responses to financial knowledge questions regarding both concepts and investment products, while Table 2 reports the patterns of responses to questions measuring self-confidence or perceived financial knowledge.

The data suggests that respondents have a better understanding of financial concepts compared to investment products. Consequently, the population perceives themselves to have better knowledge of concepts than of investment products. Interestingly the percentage of respondents who believe they possess basic knowledge is notably higher than those who actually demonstrate basic knowledge.

Table 3 reports descriptive statistics of the knowledge indices constructed by grouping the various components of each type of financial knowledge and establishing a threshold (as described in Section 3.1.2) to determine whether one possesses said knowledge or not. In essence, it provides descriptive statistics for our binary knowledge variables, which confirm previous observations.

In alternative specifications, we use the previous indices without converting them into binary variables; instead, we take the

TABLE 3 | Descriptive statistics for objective and perceived financial knowledge binary variables.

Basic knowledge	No (%)	Yes (%)
Objective knowledge of financial concepts	44.10	55.90
Perceived knowledge of financial concepts	27.05	72.95
Objective knowledge of investment products	60.96	39.04
Perceived knowledge of investment products	52.17	47.83

TABLE 4 | Descriptive statistics for objective and perceived financial knowledge composite indices.

Financial knowledge indices	Mean	SD	Range min	Range max
Objective knowledge of financial concepts (1)	2.48	1.27	0	4
Perceived knowledge of financial concepts (2)	1.39	0.77	0	4
Objective knowledge of investment products (3)	1.22	0.90	0	4
Perceived knowledge of investment products (4)	0.80	0.89	0	4

Note: (1) The range results from the addition of the number of concepts out of the four considered for which respondents answer correctly. (2) and (4) The range results from the average obtained for the three concepts considered (math, economics, and finance) or the five products (mutual funds, pension funds, shares, bonds, and savings-insurance) in the assigned value of perceived knowledge from 1 to 5 which has been rescaled from 0 to 4 for comparison reasons. (3) The range results from rescaling the original scale which range was from 0 to 20—obtained by adding the number of features out of the four considered (return, risk, liquidity, and taxation) correctly assessed in the five investment products—to a scale from 0 to 4 for comparison reasons.

number given by the index based on the concepts understood. Table 4 shows the descriptive statistics for these indices in a common scale from 0 to 4.

From Table 4, we can observe that, based on composite indexes, the score of actual knowledge is superior to that of perceived knowledge. This result contradicts those obtained using thresholds to both define a person as knowledgeable and allocate perceived financial knowledge. However, the last two columns of Table 2 illustrate how results depend on the arbitrary threshold selected. According to this, we consider the use of composite indexes to be superior to using thresholds to measure financial knowledge. This leads us to assert that the population's understanding of financial concepts exceeds that of investment products and that there is a deficiency in confidence of knowledge rather than an excess.

Our financial capability construct encompasses the application dimension, which evaluates respondents' financial management skills through their budgeting habits. Descriptive statistics for this dimension are provided in Table 5.

The table shows that 42% of respondents do not engage in any financial planning whatsoever, slightly more than 25% merely review past bank statements, and just over 32% have adopted the practice of financial budgeting.

Finally, Table 6 reports descriptive statistics concerning the variables influencing motivation or intention to act, as outlined in Ajzen (1991)'s TPB.

Table 6 shows that more than half of the sample has a strong positive attitude and feeling of control toward savings, while the social norm only represents an important incentive for about a

TABLE 5 | Financial skill or ability.

Financial skill or ability	n (%)
Not undertaking financial budgeting	629 (41.91)
Undertaking financial budgeting	872 (58.09)
Monitoring bank statements	384 (25.58)
Financial budgeting	488 (32.51)

Note: Patterns of response about financial planning budgeting (%).

TABLE 6 | Motivation towards saving.

Motivation toward saving	1—Disagree	2	3	4	5—Strongly agree
Attitude (mean 3.74)					
Periodic savings are desirable and would improve my financial situation	5.66	7.73	26.78	26.58	33.24
Control (mean 3.43)					
I believe I can regularly save according to my income	14.26	12.86	29.51	22.19	21.19
I believe I can make sound financial decisions about my savings	5.20	8.13	30.91	29.51	26.25
Social norms (mean 2.73)					
People in my community with similar profile save regularly	18.05	23.85	37.84	13.92	6.33
People important to me believe I should save regularly	20.99	15.26	38.31	14.19	11.26

Note: Response patterns on attitude, control, and social norms (%).

fourth of the individuals. Hence unfortunately, the environment (social norm) does not seem to be very encouraging to saving behavior.

4.2 | Results of the Multivariable Logistic Model With Binary Variables for Financial Knowledge

This section presents the results of the models run following the forced sequential inclusion of explanatory variables that make up the financial capability construct. The dependent variable is the dichotomous variable measuring saving behavior.

In Table 7, Model 0 includes only sociodemographic controls, while Model 1 adds the objective financial situation variables. Subsequent models sequentially incorporate the different components of the financial capability construct: objective knowledge of concepts (Model 2); objective knowledge of investment products (Model 3); self-confidence or perceived knowledge (Model 4); interactions between actual knowledge and self-confidence (Model 5); financial management skills or budgeting (Model 6); and motivation variables (Model 7). The goodness-of-fit of the logistic regression model was assessed using the Hosmer–Lemeshow test, which was non-significant for model 7, $\chi^2(8)=10.029$, $p=0.263$, indicating that the model fits the data well. Appendix 5 reports the collinearity analysis for the regressors. As showed by the variance inflation factor (VIF) and tolerance values, multicollinearity is not a concern. In addition, Appendix 6 presents the correlations between variables.

The pseudo-*R*-squared value notably increases across successive models, tripling its initial value. Sociodemographic controls such as age and education show statistically significant coefficients, with age negatively impacting savings behavior and education having a positive effect, consistent with existing literature. Age exhibits a negative influence overall but with a statistically significant positive cubic effect, suggesting that saving behavior partly adheres to the life-cycle theory, albeit with added

complexity, possibly due to heightened uncertainty in Spain's labor market characterized by high unemployment. Education maintains its statistical significance in explaining saving behavior across all models, even after incorporating all components of financial capability.

Household demographic factors such as family size and the presence of children under 15 do not show statistically significant coefficients in influencing saving behavior. This lack of significance could be attributed to conflicting factors: while the responsibility of providing for a family with children may encourage saving, the increased expenses associated with supporting a family could hinder the ability to save. The region of residence does not appear to influence family saving behavior,¹² despite regional taxation differences in Spain regarding the treatment of donations and inheritances. Likewise, the size of the municipality (HABITAT) does not affect saving behavior. The wide access to financial institutions across Spain might contribute to this result. Data from the Bank of Spain and the National Statistical Institute (INE) indicates that only 3.5% of the Spanish population lives in areas with no access to a bank branch.¹³

Variables reflecting the objective economic situation of households exhibit statistical significance and display expected signs in their coefficients. Employment status, which can serve as a proxy for income level, is significant across all models. Being unemployed, a student, or a housewife/househusband negatively impacts saving behavior compared to being employed. In the case of retirees, we find this effect to be negative and significant in models 3–7. We attribute the negative influence on savings for the retired group to the lifecycle hypothesis, which predicts that retired individuals have less capacity to save, even though in Spain the replacement rate of public pensions is higher than in US or other European countries. As expected, the housing regime of the main residence also affects saving behavior. Paying a rent adversely impact savings compared to owning a mortgage-free home. Similarly, having a personal loan also has a negative impact on savings.

TABLE 7 | Logistic regressions predicting Saving Behavior: binary variables used for financial knowledge constructs.

	Model 0	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
INTERCEPT	-0.389	0.372	0.184	0.141	-0.012	-0.179	-0.394	-2.206** (0.000)
AGE	-0.030** (0.002)	-0.036** (0.001)	-0.039** (0.000)	-0.042** (0.000)	-0.045** (0.000)	-0.046** (0.000)	-0.048** (0.000)	-0.045** (0.000)
SAGE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CAGE	0.000* (0.040)	0.000 [†] (0.082)	0.000 [†] (0.056)	0.000* (0.026)	0.000* (0.017)	0.000* (0.015)	0.000** (0.006)	0.000** (0.007)
EDU	0.375** (0.000)	0.305** (0.000)	0.258** (0.000)	0.221** (0.000)	0.167** (0.003)	0.173** (0.002)	0.148* (0.011)	0.120* (0.044)
CHILD	0.028	0.051	0.048	0.055	0.069	0.066	0.068	0.086
SIZE	-0.019	-0.045	-0.042	-0.042	-0.066	-0.067	-0.075	-0.059
ZONE—(REF: MADRID)	(0.057) ^{†,a}	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
HABITAT (REF: CAPITAL)	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
WORK (REF: EMPLOYED)		(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.001)**
1. Retired		-0.348	-0.339	-0.416 [†] (0.070)	-0.476* (0.044)	-0.462 [†] (0.051)	-0.481* (0.046)	-0.512* (0.038)
2. Unemployed ^b		-0.705** (0.000)	-0.664** (0.000)	-0.617** (0.000)	-0.610** (0.000)	-0.605** (0.000)	-0.618** (0.000)	-0.588** (0.000)
HOUSE (REF: OWNED NO MORTGAGE)		(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.001)**
1. Mortgage		0.054	0.061	0.080	0.037	0.033	0.017	0.050
2. Rent		-0.694** (0.000)	-0.662** (0.000)	-0.638** (0.000)	-0.645** (0.000)	-0.647** (0.000)	-0.659** (0.000)	-0.595** (0.001)
3. Other		-0.648* (0.038)	-0.573 [†] (0.069)	-0.552 [†] (0.085)	-0.481	-0.456	-0.523	-0.456
LOAN		-0.441** (0.001)	-0.456** (0.001)	-0.433** (0.002)	-0.405** (0.004)	-0.404** (0.004)	-0.414** (0.004)	-0.381* (0.010)
OFK (concepts)		—	0.573** (0.000)	0.415** (0.001)	0.306* (0.017)	0.613** (0.006)	0.570* (0.013)	0.415 [†] (0.078)
OKIP (invest. products)		—	—	0.734** (0.000)	0.363* (0.013)	0.533* (0.015)	0.594** (0.008)	0.657** (0.005)
SFK (concepts)		—	—	—	0.335* (0.021)	0.533** (0.005)	0.362 [†] (0.061)	0.348 [†] (0.080)
SKIP (invest. products)		—	—	—	0.754** (0.000)	0.887** (0.000)	0.879** (0.000)	0.859** (0.000)
OFK*SFK (concepts)		—	—	—	—	-0.465 [†] (0.086)	-0.394	-0.357
OKIP*SKIP (invest. prod.)		—	—	—	—	-0.315	-0.418	-0.527 [†] (0.084)

(Continues)

TABLE 7 | (Continued)

	Model 0	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
sPLAN—(REF: NO PLAN)		—	—	—	—	—	(0.000)**	(0.000)**
1. Check bank extracts		—	—	—	—	—	0.850** (0.000)	0.719** (0.000)
2. Budgeting		—	—	—	—	—	0.879** (0.000)	0.796** (0.000)
sATT		—	—	—	—	—	—	0.122 [†] (0.064)
sENV		—	—	—	—	—	—	0.138 [†] (0.053)
sCONT		—	—	—	—	—	—	0.338** (0.000)
<i>Pseudo-R-squared</i>	0.098	0.154	0.173	0.199	0.234	0.238	0.274	0.315
<i>n</i>	1501	1446	1446	1446	1446	1446	1446	1446

Note: Results shown are the estimates of the regression coefficients and their significance. [†] $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

Abbreviation: N.S., not significant.

^aCoefficients of some regions are negative with statistical significance.

^bIncludes unemployed, student, or housewife/househusband.

All financial capability constituents have a positive and significant effect on saving behavior, as evidenced by the statistical significance of the coefficients, the signs, and the increase in the pseudo-*R*-squared of the subsequent models. Regarding financial knowledge, in Models 3–5, both actual and perceived knowledge of concepts and investment products have positive and statistically significant coefficients, while the interaction terms between actual and perceived knowledge are not statistically significant or only marginally for knowledge of concepts. Pseudo-*R*-squared for Models 1–5 increases from 0.154 to 0.238 indicating that objective financial knowledge of concepts and products are relevant, and that the self-confidence in one's financial knowledge matters as well. In Models 6 and 7, when other components of financial capability are included, financial knowledge remains significant. However, coefficients for financial concepts decrease in significance, and the coefficient of the interaction term for investment vehicles becomes marginally significant, while that of the interaction of concepts loses its significance.

Budgeting, along with the practice of monitoring income and expenses through bank statements, emerges as a highly influential component of financial capability that positively affects saving behavior. In Model 6, the coefficients for these variables are significant and have the largest magnitude of the regression, alongside perceived knowledge of investment products. This finding is noteworthy, as both the literature on saving behavior and financial literacy often overlook this fundamental financial skill as a precursor to saving.

Finally, in Model 7, the coefficient of the control or self-efficacy variable remains positive and strongly significant, even after controlling for the budgeting habit. However, the coefficients of the attitude and subjective norm variables, though still positive, are lower and only marginally significant. This weak

association may be due to three interrelated factors of the Spanish economy: (i) a less developed savings culture, indicated by the lower Spanish savings rate compared to the Eurozone one; (ii) an overprotective welfare state; and (iii) the absence of taxation incentives for saving.

We retested Model 7, adding “income” as a control for objective financial situation. Sample size dropped to 1094 due to missing income data. The pseudo-*R*-squared increases from 31.5 to 36.3, and the “income” variable results highly significant, but actual and perceived knowledge of financial concepts, attitude, and social norm that were marginally significant ceased to be significant, as well as education. For the rest of the variables the effects remain the same, confirming our results. We do not report detailed results due to space constraints.

The study suggests that understanding household saving behavior requires a holistic approach to financial literacy, which encompasses not only knowledge—even when perceived knowledge is factored in—but also various other elements of financial capability. Effective budgeting, whether it involves basic monitoring of bank statements or more comprehensive strategies, along with both actual and perceived investment products' knowledge and self-efficacy, play crucial roles in shaping saving behavior.

It is intriguing that despite the emphasis in the literature on the importance of actual knowledge of the four basic financial concepts, it seems to be among the least influential components in explaining saving behavior. Conversely, knowledge of investment products, both actual and perceived, proves to be much more significant. Several factors may contribute to this outcome: (i) The variable of financial knowledge of concepts exhibits lack of internal consistency and convergent validity, as indicated by a Cronbach's alpha of 0.55 and a AVE of 0.40; (ii)

the use of arbitrary thresholds to build the financial knowledge binary variables might have a different impact on financial concepts and investment products; (iii) and finally, the potential endogeneity of the financial knowledge variables, as reverse causality could occur through the learning generated by the saving experience.

In subsequent sections we address these concerns by using alternative specifications. These approaches not only enable us to help identify potential explanations for the diminished significance of actual knowledge of financial concepts in savings behavior, but also to test the robustness of the overall results.

Section 4.3 addresses the problem of internal inconsistency of the variable of financial concepts' knowledge by splitting it into its components and re-estimating the regression. Section 4.4 removes the problem of using arbitrary thresholds to estimate whether individuals are financially knowledgeable or not by employing composite quantitative indices instead. And finally, in Section 4.5, we tackle the endogeneity problem in the financial knowledge variables by using a sub-sample that eliminates households that have or have had in the last 4 years financial investments other than deposits. We conjecture that those households managing their savings through funds, stocks, bonds, and so forth are more likely to increase their financial knowledge through "learning by doing" than those who rely on bank deposits.

4.3 | Results of the Multivariable Logistic Model Splitting the Variable of Knowledge of Financial Concepts Into Its Four Constituents

This variable, which raises concerns about reliability and convergent validity, encompasses four distinct concepts—diversification, inflation, simple interest rate, and compound interest rate—which vary in nature. To address this issue, we re-run our regression splitting this variable into the four concepts it encompasses using a binary variable for each. Table 8 presents the results. For simplicity reasons we do not include interactions in these regressions and select only some of the sequential models reported in Section 4.2 to facilitate comparison. The Hosmer–Lemeshow goodness-of-fit test for Model7_S resulted in $\chi^2(8) = 10.911$, $p = 0.207$, indicating an acceptable model fit.

Breaking down the variable of financial concepts knowledge into its components increases the pseudo-*R*-squared of the regressions. Among the four components, diversification and inflation show a positive statistically significant association with savings behavior, while simple and compound interest rates do not. The outcomes for the remaining variables remain consistent with our previous results, except for the coefficient of the investment products knowledge variable, which experiences a slight reduction in its statistical significance. This explains the lack of statistical significance previously found in the composite variable, which comprises concepts too different in nature, resulting in a lack of internal consistency for the aggregate variable. In addition, these findings suggest a potential interaction between knowledge of concepts and knowledge of investment products, a tradeoff that would be worth exploring in future research.

We are intrigued by the possibility that the financial concepts variable often used in the literature may lack other crucial fundamental concepts. For instance, we contemplate whether grasping basic accounting principles such as distinguishing between assets and liabilities, or investments and expenses, should be encompassed within the construct of financial concepts knowledge. This inquiry gains significance given the impact of budgeting skills on household saving behavior. We defer this investigation to future research endeavors.

4.4 | Results of the Multivariable Logistic Model With Composite Quantitative Indices for Financial Knowledge Instead of Binary Variables

In Section 4.2, we have found that knowledge about financial concepts, at least when measured on an aggregated basis, is less relevant than other constituents of financial capability in explaining saving behavior. This result may be due not only to the inclusion under the same construct of notions that are not equally relevant to savings behavior, as reported in Section 4.3, but also to the measurement error caused by using an arbitrary threshold to determine the number of concepts required to assess someone's financial knowledge. In this section, we attempt to overcome this limitation by employing indices that quantify the breadth of knowledge regarding concepts or investment products, rather than relying on binary variables. Table 9 reports the results of using these indices in the regression. For comparison purposes, we selected only some of the sequential models reported in Section 4.2. Regarding the model fit, the Hosmer–Lemeshow test was conducted to evaluate the goodness-of-fit of the logistic model, resulting in $\chi^2(8) = 10.563$, $p = 0.228$ in Model7_In. Along with a pseudo-*R* squared of 0.322, these results suggest that the model provides a reasonable fit to the data.

The inclusion of composite indices for knowledge variables improves the fit in the regressions, as shown by the increase in the pseudo-*R*-squared. In Model 7, we observe that while statistical significance remains strong for knowledge of investment products (both actual and perceived), it slightly changes for financial concepts. The significance of actual knowledge increases, while that of perceived knowledge disappears. Additionally, there is a drop in the coefficients of all financial knowledge variables. This drop is particularly notable for actual knowledge of investment products but is likely the result of the sharp reduction in the negative coefficient of the interaction term. However, there is hardly any variation in the coefficients or significance of variables relating to other dimensions of the financial capability construct or controls.

As an additional robustness test, we rerun model 7 replacing the SKIP scale by a direct question in which respondents had to rate their knowledge of investment products in general (instead of distinguishing by investment product type). The results do not change.

The composite financial knowledge indices do not differentiate between incorrect answers and "do not know" responses. To explore whether being incorrect is more detrimental to savings behavior than acknowledging not knowing, we recalculate these indices. In this adjustment, correct answers retain a

TABLE 8 | Logistic regressions predicting Savings Behavior: financial concepts variable split into diversification, inflation and simple and compound interest rate.

	Model 2	Mod2_S	Model 4	Model 4_S	Model 7	Model 7_S
	Binary	Splitting	Binary	Splitting	Binary	Splitting
INTERCEPT	0.184	-0.194	-0.012	-0.278	-2.028** (0.000)	-2.148** (0.000)
AGE	-0.039** (0.000)	-0.045** (0.000)	-0.045** (0.000)	-0.048** (0.000)	-0.045** (0.000)	-0.046** (0.000)
SAGE	0.000	0.000	0.000	0.000	0.000	0.000
CAGE	0.000 [†] (0.056)	0.000* (0.017)	0.000* (0.017)	0.000* (0.010)	0.000** (0.007)	0.000** (0.005)
EDU	0.258** (0.000)	0.219** (0.000)	0.167** (0.003)	0.150** (0.009)	0.115 [†] (0.053)	0.105 [†] (0.080)
CHILD	0.048	0.058	0.069	0.073	0.087	0.088
SIZE	-0.042	-0.062	-0.066	-0.077	-0.056	-0.065
ZONE—(REF.: MADRID)	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
HABITAT—(REF.: CAPITAL)	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
WORK—(REF.: EMPLOYED)	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.001)**
1. Retired	-0.339	-0.335	-0.476* (0.044)	-0.434 [†] (0.069)	-0.527* (0.032)	-0.491* (0.049)
2. Unemployed ^a	-0.664** (0.000)	-0.634** (0.000)	-0.610** (0.000)	-0.590** (0.000)	-0.594** (0.000)	-0.576** (0.000)
HOUSE (REF: OWNED NO MORTGAGE)	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.001)**	(0.002)**
1. Mortgage	0.061	0.060	0.037	0.041	0.053	0.062
2. Rent	-0.662** (0.000)	-0.628** (0.000)	-0.645** (0.000)	-0.623** (0.000)	-0.592** (0.001)	-0.568** (0.001)
3. Other	-0.573 [†] (0.069)	-0.500	-0.481	-0.416	-0.474	-0.411
LOAN	-0.456** (0.001)	-0.454** (0.001)	-0.405** (0.004)	-0.416** (0.003)	-0.385** (0.009)	-0.391** (0.008)
OFK (concepts)	0.573** (0.000)		0.306* (0.017)		0.185	
OFK_DIV (Diversification)		0.805** (0.000)		0.498** (0.000)		0.381** (0.008)
OFK_INF (Inflation)		0.361** (0.006)		0.373** (0.005)		0.307* (0.028)
OFK_IR (Simple interest)		0.271 [†] (0.050)		0.189		0.141
OFK_CIR (Compound interest)		-0.002		-0.046		-0.113
OKIP (invest. products)	—	—	0.363* (0.013)	0.250 [†] (0.096)	0.361* (0.018)	0.275 [†] (0.077)
SFK (concepts)	—	—	0.335* (0.021)	0.288 [†] (0.052)	0.202	0.169
SKIP (invest. products)	—	—	0.754** (0.000)	0.704** (0.000)	0.658** (0.000)	0.617** (0.000)

(Continues)

TABLE 8 | (Continued)

	Model 2	Mod2_S	Model 4	Model 4_S	Model 7	Model 7_S
	Binary	Splitting	Binary	Splitting	Binary	Splitting
sPLAN—(REF: NO PLAN)	—	—	—	—	(0.000)**	(0.000)**
1. Check bank extracts	—	—	—	—	0.714** (0.000)	0.704** (0.000)
2. Budgeting	—	—	—	—	0.791** (0.000)	0.767** (0.000)
sATT	—	—	—	—	0.120 [†] (0.065)	0.092
sENV	—	—	—	—	0.136 [†] (0.055)	0.137 [†] (0.056)
sCONT	—	—	—	—	0.334** (0.000)	0.338** (0.000)
<i>Pseudo-R-squared</i>	0.173	0.211	0.234	0.252	0.311	0.321
<i>n</i>	1446	1446	1446	1446	1446	1446

Note: Results shown are the estimates of the regression coefficients and their significance. [†] $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

Abbreviation: N.S., not significant.

^aIncludes unemployed, student, or housewife/househusband.

value of 1, “do not know” responses remain at 0, and incorrect answer are assigned a value of -0.5 (unlike the previous indices where they were assigned a value of 0). We then re-run the regressions with these alternative indices for financial knowledge variables.

Results, outlined in Appendix 7, show that the pseudo- R -squared are slightly lower in all the models. We conjecture that the explanation might be related to the tendency of some individuals to guess the answer to financial literacy questions, as stated by different authors (Van Rooij, Lusardi, and Alessie 2012; Lusardi and Mitchell 2014), which would blur the difference between answering wrong and answering with I do not know. Thus, forcing this difference into an index on knowledge would make the regression fit worse. Control and explanatory variables' coefficients maintain significance and values, except for financial knowledge variables, which not surprisingly, experience some small changes. The coefficients for all the financial knowledge variables are statistically significant in this new specification, although that of objective knowledge of investment products reduces its significance, while that of objective knowledge of financial concepts increases its significance. The coefficient for perceived knowledge of investment products remains the highest and strongly significant as previously.

In summary, these findings reaffirm the previous conclusion regarding the significance of various components of financial capability, extending beyond mere factual knowledge, in elucidating saving behavior. Factors such as budget planning (even when confined to bank statement review), confidence in one's knowledge and feelings of self-efficacy emerge as stronger predictors of saving behavior compared to financial knowledge alone. However, financial knowledge remains relevant, although the different significance of various types of financial

knowledge appears to hinge partially on the specific measurement approach used, owing to the potential interactions among financial knowledge of differing natures.

4.5 | Addressing Endogeneity Concerns

Hilgert, Hogarth, and Beverly (2003) claimed that personal experience is the first source of financial learning, suggesting that engaging in a financial behavior may potentially entail a learning process. Indeed, Monticone (2010) provided evidence on the impact (although very small) of wealth accumulation on financial knowledge. The author argues that the effect is small because the feedback through wealth accumulation occurs over the long term and not immediately, as in other financial behaviors such as credit card use.

Our belief is that the pathway to learning behavior related to savings or wealth accumulation is through the experiential knowledge gained from investing. As individuals invest in various financial products, such as funds, shares, or life insurance, they receive information that progressively improves their understanding of these instruments, as well as concepts such as interest rates or diversification. Even when the effect occurs over the long run, we might expect a reverse causality. However, we speculate that merely saving money, particularly if those savings are not actively invested but rather kept in a bank account, may not entail a substantial learning process regarding financial concepts or products. We could argue that saving, even when held in bank accounts, could imply some learning about concepts like interest rates and inflation. However, the consistent low-interest rates in Spain over the past decade, sometimes even dipping into negative territory,¹⁴ and historically low inflation rates averaging around 2% over the last 20 years until 2021, justify dismissing the possibility

TABLE 9 | Logistic regressions predicting Savings Behavior: indices with correct answers used for financial knowledge constructs.

	Model 2	Mod2_Ind	Model 5	Mod5_Ind	Model 7	Mod7_Ind
	Binary	Index	Binary	Index	Binary	Index
INTERCEPT	0.184	-0.251	-0.179	-0.872*	-2.206**	-2.630**
				(0.047)	(0.000)	(0.000)
AGE	-0.039**	-0.044**	-0.046**	-0.051**	-0.045**	-0.049**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SAGE	0.000	0.000	0.000	0.000	0.000	0.000
CAGE	0.000 [†]	0.000*	0.000*	0.000**	0.000**	0.000**
	(0.056)	(0.024)	(0.015)	(0.006)	(0.007)	(0.003)
EDU	0.258**	0.229**	0.173**	0.140*	0.120*	0.107 [†]
	(0.000)	(0.000)	(0.002)	(0.016)	(0.044)	(0.078)
CHILD	0.048	0.054	0.066	0.054	0.086	0.063
SIZE	-0.042	-0.049	-0.067	-0.060	-0.059	-0.045
ZONE—(REF.: MADRID)	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
HABITAT—(REF.: CAPITAL)	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
WORK—(REF.: EMPLOYED)	(0.000)**	(0.000)**	(0.000)**	(0.001)**	(0.001)**	(0.001)**
1. Retired	-0.339	-0.317	-0.462 [†]	-0.425 [†]	-0.512*	-0.477 [†]
			(0.051)	(0.074)	(0.038)	(0.054)
2. Unemployed ^a	-0.664**	-0.626**	-0.605**	-0.575**	-0.588**	-0.574**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
HOUSE—(REF.: OWNED NO MORTGAGE)	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.001)**	(0.002)**
1. Mortgage	0.061	0.049	0.033	0.054	0.050	0.074
2. Rent	-0.662**	-0.646**	-0.647**	-0.624**	-0.595**	-0.573**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
3. Other	-0.573 [†]	-0.497	-0.456	-0.416	-0.456	-0.418
	(0.069)					
LOAN	-0.456**	-0.458**	-0.404**	-0.407**	-0.381*	-0.375*
	(0.001)	(0.001)	(0.004)	(0.004)	(0.010)	(0.011)
OFK (concepts)	0.573**	0.351**	0.613**	0.419**	0.415 [†]	0.285*
	(0.000)	(0.000)	(0.006)	(0.000)	(0.078)	(0.011)
OKIP (invest. products)	—	—	0.533*	0.064**	0.657**	0.079**
			(0.015)	(0.003)	(0.005)	(0.000)
SFK (concepts)	—	—	0.533**	0.519*	0.348 [†]	0.265
			(0.005)	(0.015)	(0.080)	
SKIP (invest. products)	—	—	0.887**	0.632**	0.859**	0.635**
			(0.000)	(0.000)	(0.000)	(0.000)
OFK*SFK (concepts)	—	—	-0.465 [†]	-0.157*	-0.357	-0.104
			(0.086)	(0.036)		
OKIP*SKIP (invest. prod.)	—	—	-0.315	-0.027	-0.527 [†]	-0.038 [†]
					(0.084)	(0.056)
sPLAN—(REF: NO PLAN)	—	—	—	—	(0.000)**	(0.000)**
1. Check bank extracts	—	—	—	—	0.719**	0.720**
					(0.000)	(0.000)
2. Budgeting	—	—	—	—	0.796**	0.802**
					(0.000)	(0.000)

(Continues)

TABLE 9 | (Continued)

	Model 2	Mod2_Ind	Model 5	Mod5_Ind	Model 7	Mod7_Ind
	Binary	Index	Binary	Index	Binary	Index
sATT	—		—		0.122 [†] (0.064)	0.097
sENV	—		—		0.138 [†] (0.053)	0.130 [†] (0.071)
sCONT	—		—		0.338** (0.000)	0.339** (0.000)
<i>Pseudo-R-squared</i>	0.173	0.197	0.238	0.254	0.315	0.322
<i>n</i>	1446	1446	1446	1446	1446	1446

Note: Results shown are the estimates of the regression coefficients and their significance. [†] $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

Abbreviation: N.S., not significant.

^aIncludes unemployed, student, or housewife/househusband.

of endogenous knowledge acquisition of these concepts solely through saving in bank deposits.

Consequently, our first approach to tackle endogeneity concerns is to reanalyze the data eliminating from the survey those households that have invested their savings in financial products. The resulting sub-sample consist of 911 respondents. Table 10 presents the results compared to those obtained previously for the total sample. The first two columns correspond to the models in which knowledge is measured with binary variables, while the subsequent two columns refer to the models in which knowledge is measured through composite quantitative indices.

Table 10 demonstrates a decrease in fit for the models of non-investors, as evidenced by a reduction in pseudo-*R*-squared values from 0.315 to 0.288 for models with binary variables and from 0.322 to 0.303 for those with composite indices. This decline may be attributed to the smaller sample size leading to a loss of power, as well as the absence of the endogeneity effect in the financial knowledge metrics.

After correcting for endogeneity, the analysis reveals that actual and perceived knowledge of financial concepts no longer influence saving behavior. In contrast, this is not the case for knowledge of investment products where both actual and perceived knowledge coefficients remain positive with statistical significance. For the other constituents of the financial capability construct, the results remain consistent with respect to the full sample, as well as for the control variables.

This finding suggests that the previously observed correlation between knowledge of financial concepts and savings in the full sample might be the result of a reverse causality effects. Engaging in investment practices may enhance investors' understanding of concepts like diversification, inflation, and interest rates. What is surprising is that actual knowledge about investment products does maintain a statistically significant positive impact on saving behavior once endogeneity is corrected for. Hence, it appears that the crucial knowledge influencing saving behavior pertains to investment products, even

when households are not actively engaging in investment activities, rather than general financial concepts like interest, diversification, or inflation.

4.5.1 | Instrumental Variable Approach

We also tackle endogeneity using instrumental variables (IV) as commonly done in the literature, with results outlined in Appendix 8. Identifying a suitable instrumental variable (IV) is challenging, as highlighted by Gill and Bhattacharya (2017), who acknowledged their inability to find exogenous IVs to address potential endogeneity in the correlation they observed between financial literacy and savings. Lusardi and Mitchell (2007) proposed an IV for financial knowledge, utilized also by Van Rooij, Lusardi, and Alessie (2012) and Deuflhard, Georgarakos, and Inderst (2019). This IV is based on a measure of the economic education acquired during schooling.

While our dataset does not include the proposed measure, it does contain information on the academic field pursued by respondents with university education. These fields encompass Business Studies/Law, Social Sciences, Engineering/Architecture, Science, Health Science, and Arts and Humanities. These categories, ranked according to economic and numerical literacy components, could serve as an instrument for financial knowledge (referred to as UNI_STUDIES). This strategy restricts the sample to the 547 respondents with university degrees.¹⁵ To implement this approach, we need to create a unique variable for financial knowledge, as we only have one IV potentially associated with all considered financial knowledge variables, including perceived knowledge. To this end, we create an aggregated scale for financial knowledge based on the indices previously used for financial knowledge variables.

Previously, as a robustness test, we rerun model 7 with the subsample of respondents with university degree. The overall results are robust. There are only two changes compared to the previous models. The first one is the lack of significance regarding the influence of homeownership status, which does

TABLE 10 | Logistic regressions predicting Savings Behavior addressing endogeneity concerns: non-investors sub-sample.

	Model7	Non-investors	Model7_Ind	Non-investors
	Binary	Binary	Index	Index
INTERCEPT	-2.206** (0.000)	-1.881**	-2.630** (0.000)	-2.354** (0.000)
AGE	-0.045** (0.000)	-0.055** (0.000)	-0.049** (0.000)	-0.057** (0.000)
SAGE	0.000	0.000	0.000	0.000
CAGE	0.000** (0.007)	0.000* (0.024)	0.000** (0.003)	0.000* (0.017)
EDU	0.120* (0.044)	0.105	0.107 [†] (0.078)	0.095
CHILD	0.086	0.146	0.063	0.128
SIZE	-0.059	-0.060	-0.045	-0.047
ZONE (REF.:M.A.MADRID)	N.S.	N.S.	N.S.	N.S.
HABITAT (REF.: CAPITAL)	N.S.	N.S.	N.S.	N.S.
WORK (REF.: EMPLOYED)	(0.001)**	(0.069) [†]	(0.001)**	(0.084) [†]
1 RETIRED	-0.512* (0.038)	-0.268	-0.477 [†] (0.054)	-0.242
2 UNEMPLOYED ^a	-0.588** (0.000)	-0.426* (0.021)	-0.574** (0.000)	-0.418* (0.026)
HOUSE (REF.: OWNED NO MORTGAGE)	(0.001)**	(0.007)**	(0.002)**	(0.007)**
1. MORTGAGE	0.050	0.062	0.074	0.055
2. RENT	-0.595** (0.001)	-0.566** (0.006)	-0.573** (0.001)	-0.591** (0.005)
3. OTHER	-0.456	-0.660 [†] (0.097)	-0.418	-0.586
LOAN	-0.381* (0.010)	-0.341 [†] (0.050)	-0.375* (0.011)	-0.322 [†] (0.067)
OFK	0.415 [†] (0.078)	0.146	0.285* (0.011)	0.168
OKIP	0.657** (0.005)	0.608* (0.027)	0.079** (0.000)	0.093** (0.001)
SFK	0.348 [†] (0.080)	0.259	0.265	0.285
SKIP	0.859** (0.000)	0.537* (0.019)	0.635** (0.000)	0.533* (0.017)
OFK*SFK	-0.357	0.009	-0.104	-0.041
OKIP*SKIP	-0.527 [†] (0.084)	-0.557	-0.038 [†] (0.056)	-0.066* (0.019)
sPLAN (REF: NO PLAN)	(0.000)**	(0.000)**	(0.000)**	(0.000)**
1. Check bank extracts	0.719** (0.000)	0.612** (0.002)	0.720** (0.000)	0.604** (0.002)

(Continues)

TABLE 10 | (Continued)

	Model7	Non-investors	Model7_Ind	Non-investors
	Binary	Binary	Index	Index
2. Budgeting	0.796** (0.000)	0.812** (0.000)	0.802** (0.000)	0.792** (0.000)
sATT	0.122 [†] (0.064)	0.178* (0.022)	0.097	0.158* (0.044)
sENV	0.138 [†] (0.053)	0.091	0.130 [†] (0.071)	0.098
sCONT	0.338** (0.000)	0.231** (0.009)	0.339** (0.000)	0.226* (0.012)
<i>Pseudo-R-squared</i>	0.315	0.288	0.322	0.303
<i>n</i>	1446	911	1446	911

Note: Results shown are the estimates of the regression coefficients and their significance. [†] $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

Abbreviation: N.S., not significant.

^aIncludes unemployed, student, or housewife/househusband.

not surprise us given the greater homogeneity of the sample in terms of socioeconomic level, as it is restricted to the university population. The second change is somewhat less expected. The variable measuring objective knowledge of investment products, as well as its interaction with confidence in said knowledge, loses significance. Nevertheless, the most revealing results of the study, that is, the relevance of self-confidence in investment products knowledge, budgeting and the prominent role of self-efficacy, remain unchanged.

Since econometric software packages like SPSS or STATA lack automated procedures for IV in logistic models, we conduct the IV regression in two separate steps. First, we regress the endogenous variable FINKNOW on UNI_STUDIES (the instrument) and the rest of the variables included in our global model, saving the predicted values of FINKNOW as a new variable (FINKNOW_PRED). Then, in the second step, we run the logistic regression for our global model using the FINKNOW_PRED alongside the other explanatory variables. However, this approach lacks access to post-estimation validation and endogeneity tests available in STATA for IV estimation in OLS, which assess potential endogeneity of the variable and the validity of the instrument.

To address the above limitations, we also run an OLS regression in STATA v.18 using all levels of the dependent variable SAVINGS instead of its binary (see Appendix 1 for the descriptive statistics). We employ a 2SLS estimator, akin to the two-step method used in the logistic IV regression. Results are detailed in Appendix 8, Table A3, along with validation and endogeneity tests in Table A4.

As showed in Table A4, the endogeneity tests performed, including –the Durbin (p -value 0.9823) and the Wu–Hausman test (p -value 0.9828) are not significant. This implies that we cannot reject the null hypothesis that the FINKNOW variable is exogenous. Following Bastardo et al. (2023, 15), we neglect IV estimations: “Researchers should perform an endogeneity test (e.g., Hausman 1978) to see whether the instrumented variable (the potentially endogenous predictor) was indeed endogenous. If IVs

are valid, the sample size is sufficiently large, and the endogeneity test is not significant, then researchers can build on the efficient estimator for their inferences (e.g., OLS).”

Furthermore, Bastardo et al. (2023), claimed that a valid IV must meet three criteria: the relevance condition; the (as if) random condition; and the exclusion restriction condition. The relevance condition means that the IV needs to predict a sufficient part of the exogenous variation in the variable supposedly affected by endogeneity. The first stage regression statistics reported in Table A4 of Appendix 8 show that the partial R -square, which measures the correlation between the instrument UNI_STUDIES and the endogenous variable FINKNOW, after removing the effect of the other explanatory variables, is 0.028, which seems too small, implying a weak-instrument problem.¹⁶ Accordingly, we cannot reject the null hypothesis that the instrument is weak, and therefore the relevance condition is not met. Therefore, we must reject the IV estimate, even if the other two conditions remained.

Therefore, we rely on our first approach to correct for any potential endogeneity.

5 | Discussion: Influence Channels of Financial Capability on Savings Behavior

This research explores the influence of four dimensions of financial capability (knowledge, confidence, money management skills, and motivation) on savings behavior. As expected, our results document that the four dimensions are relevant to explain savings behavior. Therefore, H1 is fulfilled. However, not all the tested hypotheses within each dimension are confirmed.

5.1 | Financial Knowledge

Concerning financial knowledge, our findings indicate that when the four dimensions of financial capability (knowledge,

confidence, money management skills, and motivation) are included in the analysis, understanding the four basic economic-financial concepts popularized by the S&P Global FinLit Survey—simple and compound interest rate, inflation and diversification—appears to have little to no effect on influencing saving behavior (therefore, H2a is not supported). This result is intriguing and conflicting with the mainstream literature. Nonetheless, several mechanisms might explain this unexpected result.

Our analysis revealed that the marginally significant correlation between knowledge of financial concepts and savings, evident in the overall sample, vanishes entirely when we examine the subsample of households that do not engage in financial products investment. This suggests a potential reverse causality: it may be that involvement in investment activities enhances investors' comprehension of key concepts like diversification, interest rates, and inflation, rather than the other way around. However, some researchers maintain that, after correcting for endogeneity, knowledge of these financial concepts is an influential channel to savings (Behrman et al. 2012) and planning for retirement (Lusardi and Streeter 2023).

A non-competing explanation that might account for the results reported by other authors, is that the influence of knowledge about financial concepts on savings may operate indirectly, mediated by other relevant factors that were omitted in their research but were considered in ours. White et al. (2021) showed that knowledge of financial concepts is positively correlated with the financial self-efficacy component of motivation grounded in the TPB and money management skills related to budgeting and tracking expenses. They further noted that money management skills are also linked to self-efficacy. We conjecture that similar influential channels might be at play in driving our results. Our holistic approach to the concept of financial capability, incorporates the dimensions of money management skills and self-efficacy (a motivational element proposed by the TPB), which would help explain our findings. We hypothesize that Knowledge of financial concepts could be influencing savings indirectly through these channels instead of directly. Nevertheless, this hypothesis would require further research for validation.

In contrast, our findings reveal that knowledge of investment products significantly influences savings (H2b is met) even after accounting for all dimensions of financial capability. Moreover, when we focus our analysis on non-investors, to mitigate endogeneity concerns, this effect remains evident. This result is particularly intriguing because, while it stands to reason that a deeper understanding of investment products would enhance households' financial investment in these products, one might expect this knowledge to hold little relevance for savers who do not participate in financial investing.

We suggest a potential mechanism that could be driving this effect. We believe that individuals' awareness of investment products may motivate them to save more in anticipation of potential future investments. Individuals who are knowledgeable

may recognize the importance of building a savings cushion to eventually transition into investing. These investments may not have materialized for various reasons, such as waiting for more favorable market conditions or a tendency to be cautious due to risk aversion.

In summary, the previous findings suggest that basic financial knowledge (inflation, diversification, etc.) does not directly influence savings behavior; however, we acknowledge that it may do so indirectly through its effect on other components of financial capability, including money management skills and self-efficacy. In contrast, more specific or sophisticated knowledge related to investment products appears to have a direct impact on saving behavior, even when individuals are not actively investing.

5.2 | Financial Self-Confidence and Its Interaction With Actual Financial Knowledge

Consistent with our earlier findings, we observe a weak or non-existent effect of self-confidence on savings related to financial concepts (H3a is not fulfilled), whereas there is a strong positive effect of self-confidence related to investment products on savings (H3b is confirmed). Moreover, regarding investment products, the coefficient for self-confidence is roughly six times greater than that of actual knowledge. Our results for perceived knowledge of investment products align with other authors who also documented a stronger effect of perceived knowledge than actual knowledge on financial outputs (Vörös et al. 2021; Anderson, Baker, and Robinson 2017).

Nevertheless, we cannot exclude the possibility that this direct relationship may actually be indirect, mediated by variables that our study has overlooked but that other researchers have identified as being influenced by subjective knowledge, likely serving as significant channels in savings behavior. For instance, Nuñez-Letamendia and Poher (2020) found that individuals' perceived knowledge about investment products is a key factor influencing their trust in the overall financial system and in banking institutions. In addition, Sapienza and Zingales (2012) showed that trust in banks discourages individuals from withdrawing their deposits, while Beckmann and Mariya (2017) reported that trust in banks increases the likelihood of formal savings, particularly in bank accounts. Therefore, it is possible that the inclusion of the trust dimension in our model may alter our results, limiting the direct effect of perceived knowledge about investment products on savings and channeling it through its effect on trust. Furthermore, Burke and Hung (2021) highlighted that financial trust is a significant predictor of the use of financial advice, which is also associated with retirement planning. Consequently, two influential channels through which perceived knowledge may impact savings are the utilization of financial advice—fueled by trust—and financial trust itself, which is influenced by perceived knowledge or self-confidence. However, future research needs to test the hypothesis that these two variables omitted from our study—trust and financial advice—may serve as indirect channels of influence through which perceived knowledge affects saving behavior.

Korankye and Kalenkoski (2021) showed that parents with high subjective financial knowledge have a higher probability of saving for college, while parents with high actual knowledge related negatively to saving for their children's college education. They speculate that "It could therefore be the case that individuals who are more financially literate would prioritize saving for retirement over children's education" (p. 17). Our results, however, contrast with Korankye and Kalenkoski (2021) speculation in that we demonstrate that objective financial knowledge is not as influential for overall savings (which include retirement savings), while subjective financial knowledge is.

We also find evidence about a statistically significant, albeit small, negative interaction effect between self-confidence and knowledge of investment products (H3d is met) while no such interaction exists between confidence and knowledge of financial concepts (H3c is not supported). Ultimately, the negative interaction suggests that rather than reinforcing one another, there is a trade-off effect. Our findings complement the literature about overconfidence (Anderson, Baker, and Robinson 2017; Asaad 2015).

5.3 | Money Management Skills

Our findings highlight the critical role of budgeting as an influential channel in shaping savings behavior (H4b is fulfilled). These results align with the arguments put forth by Hung, Parker, and Yoong (2009), who contend that financial literacy shapes financial behaviors by facilitating goal setting and financial planning. By creating and adhering to a budget, individuals can better assess their financial situations, establish attainable objectives, and develop actionable plans to reach those goals. The intuitive connection between budgeting and positive saving outcomes is rooted in the premise that households can enhance their savings by controlling expenses, increasing income, or both. Our findings align with those of Xiao and O'Neill (2018), who identified a positive correlation between budgeting and favorable financial behaviors, such as saving for emergencies and assessing retirement needs. As such, budgeting has long been established by financial practitioners and educators as an influential mechanism for managing spending and achieving saving goals, making it unsurprising that individuals who consistently maintain a spending plan tend to save more.

Of particular interest is our discovery that the simple habit of monitoring past expenses through bank statements serves as a significant channel of influence on saving behavior (H4a is fulfilled). We suggest that the habit of monitoring past expenses may be related to the Theory of Mental Accounting developed by Thaler (1985), particularly to the concept of "mental budgeting" as discussed by Heath and Soll (1996) and Antonides, De Groot, and Van Raaij (2011), wherein money is allocated to various expense and savings categories, and budgets reserved for each category are considered binding. Mental budgeting, therefore, instills a discipline mindset that promotes saving. Given that nearly 70% of households in our sample do not engage in any forward financial planning or budgeting and approximately 42% do

not monitor income and expenses retrospectively, our findings underscore the need to effectively integrate theory with practice to emphasize essential elements of financial capability. It is also worth noting that, as previously mentioned, White et al. (2021) found that financial knowledge influences money management skills, further reinforcing the channels of influence that budgeting and monitoring can provide.

5.4 | Motivation

In terms of motivation to engage in a behavior, the TPB posits that attitude, subjective norm, and self-efficacy collectively shape behavioral intention. Our study emphasizes the pivotal role of self-efficacy as a key driver of saving behavior (H5c is confirmed), surpassing the influence of both attitudes and social norms. In fact, we observe a minimal or negligible impact of attitudes and subjective norms (H5a and H5b do not receive support in most of the models) on savings. The significance of self-efficacy in influencing financial behaviors has also been noted in the literature, with Xiao et al. (2011) highlighting its importance in the context of credit and Lown et al. (2015) in relation to savings. Our findings are consistent with those of Magendansa, Guttelingb, and Zebela (2017), who observed a strong impact of self-efficacy on savings intentions, while finding no significant influence from subjective norms.

Nevertheless, it is important to acknowledge that the potential indirect effect of attitude and subjective norms on savings via budgeting, as identified by Shim, Serido, and Tang (2012) may serve as a channel of influence that helps explain the limited direct impact of these factors in our model. Interestingly White et al. (2021) findings point to budgeting as an influential channel to self-efficacy. These dynamics underscore the intricate nature of financial capability constituents, indicating a need for additional research.

5.5 | Socio-Economic Controls

As expected, the objective financial circumstances of households, such as labor status, housing situation, personal loan holdings, and income, significantly influence savings behavior. Regarding other control variables, the association between age and savings follows a cubic function (i.e., sinusoidal), deviating from the quadratic pattern predicted by Modigliani's Theory of Savings Life Cycle. We conjecture that this departure may be attributed to longer lifespans and less stable employment conditions compared to Modigliani's era. In fact, Ventura and Horioka (2020) illustrated the role of longevity risk, and bequest motives, in explaining saving behavior and wealth accumulation among retired Italian households. The influence of general education is only marginally significant, or even it shows no significance in some models. Gray, Montagnoli, and Moro (2021) similarly find that general education does not affect financial behaviors, advocating for targeted financial educational policies.

The other anticipated influential channels—such as family size, having children under the age of 15, geographic location,

and population density—show no significant effects in the analyzed models. While having children might intuitively seem to limit a household's ability to save, it could also motivate saving behavior. Family size likely operates along this same line, as larger families usually include children. We had hypothesized that geographical area might influence saving behavior due to varying taxation on transactions like inheritances or family donations, which could encourage saving; however, this does not appear to be the case. Lastly, residing in less populated areas does not seem to impede saving behavior. We speculate that the threshold of 50,000 inhabitants used to categorize the sample may be too high to effectively capture the rural characteristics of the population.

Finally, we would like to point out that the literature often incorporates the variable of risk tolerance (Grable and Lytton 1999) in the study of various financial behaviors, such as borrowing and holding risky assets in household portfolios (Grable et al. 2009; Grable, Lyonsb, and Heoc 2019; Zhu and Xiao 2022). Since we are focusing on household savings behavior, regardless of whether these savings are allocated to risk-free or risky assets, we believe that the inclusion of this variable is not particularly relevant. Savings behavior differs from investment behavior in that it generally avoids uncertainty—except when savings are directed toward investments. As a result, we propose that this influential channel may have limited relevance in our study, especially when using the non-investor subsample, which constitutes the majority of our overall sample.

6 | Conclusions, Limitations, and Future Research

This study contributes to the existing literature by exploring the underlying mechanisms that influence saving decisions. Our findings align with the theoretical framework proposed by Lučić, Barbić, and Uzelac (2023), which draws from various theories in economics, sociology, and psychology, emphasizing that financial decisions are driven by socio-demographics factors, cognitive and affective elements, and personality and values components. In line with this framework, we found that understanding savings decisions encompasses more than just acquiring pertinent knowledge; it also prioritizes fostering confidence (personality and value factors in this framework), cultivating budgeting habits, and enhancing self-efficacy (cognitive and affective factors). Thus, our study advocates for a comprehensive approach to financial education and decision-making frameworks.

From a theoretical standpoint, our research underscores the importance of conducting a comprehensive review of the concepts forming the basis of financial knowledge for households. We highlight the critical role of understanding investment products and practical accounting concepts, such as budget planning. Effective financial education programs should extend beyond economic concepts or investment vehicles and other potentially relevant topics, fostering abilities such as budgeting and financial statements monitoring, while instilling confidence in one's financial abilities. The significance of budget planning, coupled with the prevalence of households not engaging in forward financial planning or monitoring income and expenses ex-post,

emphasizes the urgent need to bridge theory and practice in financial education.

Our research has implications for various stakeholders, including families, educational institutions, financial intermediaries, and policymakers. We challenge the notion that reductionist financial education can impact behavior and advocate for a re-evaluation of learning in this domain. Policymakers could support educational programs focused on practical problem-solving and applied learning and mentorship. Such an approach, tailored to specific socioeconomic and institutional factors, can empower individuals to manage their finances effectively, make informed decisions, and work towards achieving their financial and saving goals.

6.1 | Limitations and Future Research

Our research has some limitations worth mentioning. First, the model specification used may be limited in capturing the full complexity of relationships between variables comprising the financial capability construct. More complex models that account for moderating and mediating effects could provide a more accurate depiction. While we analyzed some interactions among explanatory variables, not all possibilities were explored. Future research should address this limitation by employing models such as Structural Equation Modelling (SEM) that can accommodate this complexity.

Another limitation of our study pertains to the selection of variables and indicators used to gauge financial capability. It is possible that omitted variables—such as knowledge of practical accounting concepts, utilization of financial advice, or trust in the financial system and intermediaries—may influence the financial behavior examined. In addition, while we introduced an indicator to measure knowledge of investment products, which is crucial for effective savings management, further research should refine and enhance this indicator to improve its validity. Indeed, future financial knowledge scales should prioritize reliability, validity, and comprehensiveness to more effectively capture the construct domain.

Despite our efforts to analyze the potential impacts of measurement errors on financial knowledge variables, ensuring unbiased results remains uncertain. Therefore, this area warrants further research to address potential sources of bias and enhance the robustness of findings.

The survey being collected among the Spanish population means that the findings may be influenced by the specific cultural, social, legislative, and institutional framework affecting Spanish households. Consequently, the applicability of the findings to other countries should be approached with caution. In addition, it is possible that the data collection period coinciding with the COVID-19 pandemic may have influenced the respondents' answers, even when questions related to periods prior to the pandemic.

Despite these limitations, we believe our study contributes to the literature on savings behavior and financial literacy.

Acknowledgments

We sincerely appreciate the valuable feedback and insights provided by the three anonymous reviewers and the editor. Undoubtedly, the revisions have substantially improved and strengthened the manuscript.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Endnotes

- ¹ The use of correct answers to assess the financial knowledge overestimate the population regarded as knowledgeable. The rationale is that in questions for instance with three options of answers (correct, incorrect, and do not know) when part of the individuals guesses the answers, they have a 50% of probability of being correct and a 50% of being incorrect and hence, some of those responses classified as correct are actually guessed.
- ² Some of these apps are: Mint (<https://mint.intuit.com/>); Ynab (<https://www.ynab.com/>); GoodBudget (<https://goodbudget.com/>); EveryDollar from Ramsey (<https://www.ramseysolutions.com/ramsey-plus/everydollar>); Copilot (<https://copilot.money/>), and so forth.
- ³ As they mentioned, they build on previous surveys “Specifically, we took questions from the National Council of Economic Education Survey, the NASD Investor Knowledge Quiz, the 2004 Health and Retirement Study module on financial literacy and planning, the Survey of Financial Literacy in Washington State, and the 2001 Survey of Consumers.”
- ⁴ Cronbach’s Alpha 0.84; Composite Reliability 0.95; AVE first order 0.52, and second order 0.37.
- ⁵ Netquest has a panel of about 100,000 Spanish individuals who respond to online surveys sent to them in exchange for incentives in the form of small gifts.
- ⁶ 93.9% of the Spanish population in the 20–74 age range used internet in the last 3 months of 2021 based on INE (National Institute of Statistics) statistics.
- ⁷ The survey was administrated during the initial stages of the Covid-19 pandemic, so the question referred to the time preceding the pandemic, to avoid the results being influenced by the extraordinary consequences of the moment.
- ⁸ Savings brackets based on disposable income are: <15%; from 15% to <25%; from 25% to <35%; 35% or more.
- ⁹ S&P Global FinLit Survey | Global Financial Literacy Excellence Center (GFLEC).
- ¹⁰ We centered the age on the mean to avoid the multicollinearity resulting from the introduction of the squared and cubed age variable in the regression.
- ¹¹ Gender is not included in the models as control since savings behavior refers to the Household.
- ¹² In Model0, which limits the adjustment to demographic control variables, coefficients for some regions (Northeast, South and Islands) were marginally significant and negative.
- ¹³ https://cincodias.elpais.com/cincodias/2021/10/11/companias/1633955023_164189.html.
- ¹⁴ The 1-year Euribor remained below 1% from August 2012 to August 2022, dipping into negative territory from February 2016 to March 2022.
- ¹⁵ Consequently, we eliminate from the regression the variable education as we restrict the sample to those respondents holding university degrees.

¹⁶ Although the F -statistic in the first state regression (14.9404) exceeds the critical value (p -value 0.0001) it is under the critical value (16.38) at a rejection rate of 10% of a nominal 5% Wald test.

¹⁷ Ordinal variables with more than five groups are treated as quantitative variables for practical purposes.

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Appendix 1

Descriptive Statistics for the Dependent Variable and Controls (*n* = 1501)

Variables	Sample, <i>n</i> (%)	Spanish population ^a (%)
Dependent variable		
Households not saving	546 (36.4)	
Households saving	955 (63.6)	
Saving less than 15%	504 (33.6)	
Saving between 15% and 25%	294 (19.6)	
Saving between 25% and 35%	85 (5.7)	
Saving more than 35%	72 (4.8)	
Households and individuals' socio-demographic controls		
Female	771 (51.4)	51.0
Age 20–34	379 (25.2)	22.9
Age 35–54	588 (39.2)	44.0
Age 55–74	534 (35.6)	33.0
College/University education	563 (37.5)	
High-level professional qualifications (PQ)	287 (19.1)	
Medium-level PQ/Baccalaureate	424 (28.2)	
High School Education (up to 16 years-old)	178 (11.9)	
Primary Education (up to 12 years-old)	49 (3.3)	
Socioeconomic status A	339 (22.6)	25.4
Socioeconomic status B	187 (12.5)	13.9
Socioeconomic status C	391 (26.0)	25.5
Socioeconomic status D	205 (13.7)	12.2
Socioeconomic status E	379 (25.3)	23.0
Has children under 15	444 (29.6)	
Up to 3 cohabitants	1097 (73.1)	
More than 3 cohabitants	404 (26.9)	
NE/Catalunya and Balearic Is. (zone1) and MA Barcelona (zone8)	314 (20.9)	21.3

Variables	Sample, <i>n</i> (%)	Spanish population ^a (%)
East (zone2)	220 (14.7)	14.7
South/Andalucía (zone3)	294 (19.6)	19.7
Center (zone4) and MA Madrid (zone9)	329 (21.9)	21.8
Northwest (zone5)	140 (9.3)	8.7
North-Center (zone6)	134 (8.9)	8.9
Canary Islands (zone7)	70 (4.7)	4.8
Capital of province	629 (41.9)	
Non-capital ≥ 50,000 inhabitants	290 (19.3)	
Non-capital < 50,000 inhabitants	582 (38.8)	
Households and individuals' economic situation controls		
Employed/Self-employed	757 (50.4)	
Retired	330 (22.0)	
Unemployed/Student/Housekeeper	414 (27.6)	
Household's personal loan	377 (25.1)	
Non personal loan	1069 (71.2)	
No response (NR)	55 (3.7)	
House owner no mortgage	658 (43.8)	
House owner mortgage	436 (29.1)	
House rented	337 (22.4)	
Other housing situation	70 (4.7)	
Less than €20k income	493 (32.9)	
€20–60k income	560 (37.3)	
Over €60k income	62 (4.1)	
No response (NR) income	386 (25.7)	

Note: Source for the variable Socioeconomic Status: Association for Media Research, data from 2021 (Report "General overview of the media in Spain in 2022": <https://www.aimc.es/a1mc-c0nt3nt/uploads/2022/01/marco2022.pdf>).

^a Source for the variables Gender, Age, and Geographical Area: Spanish Statistical Office, data from 2021 (<https://www.ine.es/jaxi/Datos.htm?path=/t20/e245/p08/10/&file=01002.px>).

Appendix 2

Questions Used to Assess Financial Knowledge

Objective knowledge of financial concepts (OFK)

- “Imagine you have some money saved, do you think it is safer to invest it in a single investment product or to spread it over several? Single/Several/Do not know” [diversification].
- “Suppose that over the next 10 years the prices of consumer goods (e.g., food, clothing) double. If your income also doubles, will you be able to purchase fewer/the same/more goods than you currently do? Fewer/The same/More/Do not know” [inflation].
- Suppose you need to borrow €100 for 1 year, and at the end of that year you have to repay the loan plus the interest charged on it, which amount would be lower when it comes to repaying the loan plus the interest? €105/€100 ± 3%/Do not know [simple interest].
- Suppose you put money in a bank deposit with a 2-year period of maturity and during that period you do not withdraw any money from the deposit. If the bank remunerates the money in the deposit at an annual interest rate of 15%, will the bank give you more/less/the same money for your deposit the second year than the first year? More/Less/The same/Do not know [compound interest].

Perceived knowledge of financial concepts (SFK)

- “Indicate, in a 5-point scale, what you think is your level of knowledge” on the subsequent three subjects: *mathematics, economics, and finance*.

Objective knowledge of investment products (OKIP)

- “In relation to the following characteristics, rate the level, of each of these investment products: pension funds, mutual funds, life-saving insurances, shares, and bonds” [in the survey we presented a table with the five investment products considered in rows, and the level of the characteristic to be assessed in columns, which facilitates the assignment by comparison]:
 - Expected return: Low/Medium/High/Do not know.
 - Risk: Low/Medium/High/Do not Know.
 - Liquidity: Low/Medium/High/Do not know.
 - Taxation: Low or Favorable/Medium or Neutral/High or Unfavorable/Do not Know.

Example of the table presented in the Survey

In relation to the following characteristic, assess the level of each investment product.

Expected return ^a	Low	Average	High	Do not know
Mutual funds				
Pension funds				
Stocks				
Bonds				
Life-savings insurances				

Note: For each characteristic (return, risk, liquidity, and taxes) we formulated a question using the same kind of table.

^a Expected return is the average annual return you would expect to achieve on a medium-term investment, for example, between 5 and 10 years.

We acknowledge the difficulty in determining the right answer for each of the investment products regarding the characteristics mentioned above, as there is a lot of diversity within each type of product. That is why we accept as correct the following different answers:

	Pension fund	Mutual F.	Life-saving Ins.	Shares	Bonds
Return	M/H	M/H	L	M/H	L
Risk	M	M/H	L	H	M
Liquidity	L	M/H	L	H	M/H
Taxation	L	M	L	H	H

Perceived knowledge of investment products (SKIP)

- “Indicate, in a 5-point scale, what you think is your knowledge” on the following five investment products: *Pension Funds; Mutual or Investment Funds; Life-saving Insurances (Retirement Savings Account/Life-Savings Insurances); Shares of Listed Companies; and Bonds or Fixed Income Securities*.

Appendix 3

Reliability and Validity of the Subjective and Objective Measures of Financial Knowledge

A Confirmatory Factor Analysis (CFA) was performed in order to assess the measurement quality of the four scales employed in our work related to financial knowledge—that is, objective financial knowledge of concepts (OFK), objective knowledge of investment products (OKIP), subjective financial knowledge of concepts (SFK), and subjective financial knowledge of investment products (SKIP). We considered OKIP as a second-order factor, composed by four first-order factors (Return, Risk, Liquidity, and Fiscality). In the CFA conducted, all the indicators loaded on their assigned latent constructs, with no cross-loadings allowed. The CFA for this model shows a reasonably good fit (CFI = 0.901; TLI = 0.892).

In order to establish the reliability of the four scales, Cronbach's alphas and CR were considered. As can be seen in Table A1, all the scales have Cronbach's alphas and CR above the recommended values of 0.8 and 0.7, respectively (Cheung et al. 2023), except for OFK, raising concerns regarding its reliability.

Regarding convergent validity, the AVE is calculated and reported in Table A1, for which a value over 0.5 is widely recommended.

For the OFK scale, the AVE is under the recommended threshold. However, if the AVE is greater than 0.4 and CR is higher than 0.6, convergent validity can be considered acceptable (Fornell and Larcker 1981; Lam 2012; Hair et al. 2016).

For the OKIP scale, the AVE for the first order factors and for the second order factors (AVE second order) were calculated. Credé and Harms (2015) suggested, as evidence for convergent validity, that the AVE of first-order factors should be at least 0.49 and the AVE of second order factors be 0.24. Therefore, convergent validity does not pose a concern in this case.

For the SFK and SKIP scales, all the criteria for reliability and convergent validity are met.

Regarding discriminant validity, we used the Fornell–Larcker criterion (Fornell and Larcker 1981), which requires that the square root of each construct's AVE should be greater than the correlation of the constructs. Table A2 presents the latent constructs' correlations and the square root of the AVE in the diagonal. We find just two correlations that do not meet the Fornell–Larcker criterion: the correlation between OFK and OKIP is 0.68, while the square root of the AVE of OFK is 0.63; and the correlation between SKIP and OKIP is 0.73, while the square root of the AVE of OKIP is 0.72. However, all the correlations between the four constructs are below 0.8, and therefore, following Rönkkö and Cho (2022), we consider that discriminant validity is not a problem in our study.

TABLE A1 | Construct reliability and convergent validity.

	Cronbach's alpha	Composite reliability	AVE—(AVE second order)
OFK	0.56	0.70	0.40
OKIP	0.84	0.95	0.52 (0.37)
SFK	0.83	0.88	0.72
SKIP	0.93	0.96	0.83

TABLE A2 | Discriminant validity.

Constructs	OFK	OKIP	SFK	SKIP
OFK	0.63			
OKIP	0.68	0.72		
SFK	0.52	0.55	0.85	
SKIP	0.49	0.73	0.76	0.91

Note: Bold indicates the square root of the AVE and the numbers in plain text refer to the latent constructs correlations.

Appendix 4

Descriptive Statistics. Patterns of Responses to Objective Financial Knowledge Questions on Investment Products (%)

Knowledge of investment products		Correct	Incorrect	Do not know
Mutual funds	Expected return	43.03	27.32	29.65
	Risk	50.83	17.79	31.38
	Liquidity	40.04	25.32	34.64
	Taxation	23.85	28.11	48.03
	Mean	39.44	24.64	35.93
Pension funds	Expected return	30.25	35.44	34.31
	Risk	26.65	36.58	36.78
	Liquidity	35.04	25.12	39.84
	Taxation	17.99	31.65	50.37
	Mean	27.48	32.20	40.33
Life-savings insurance	Expected return	38.77	32.18	29.05
	Risk	36.91	31.52	31.58
	Liquidity	35.31	30.84	33.84
	Taxation	23.18	31.25	45.57
	Mean	33.54	31.45	35.01
Shares	Expected return	38.31	25.32	36.38
	Risk	26.65	37.58	35.78
	Liquidity	15.86	43.97	40.17
	Taxation	21.92	26.51	51.57
	Mean	25.69	33.35	40.98
Bonds/fixed income	Expected return	36.84	29.98	33.18
	Risk	23.05	42.44	34.51
	Liquidity	33.11	27.91	38.97
	Taxation	12.72	37.04	50.23
	Mean	26.43	34.34	39.22

Appendix 5

Collinearity Analysis

Binary financial knowledge variables			Indices for financial knowledge variables		
	Tolerance	VIF		Tolerance	VIF
AGE_C	0.788	1.268	AGE_C	0.782	1.279
EDU	0.773	1.293	EDU	0.745	1.342
CHILD	0.692	1.445	CHILD	0.690	1.449
SIZE	0.647	1.546	SIZE	0.645	1.550
ZONE	0.975	1.026	ZONE	0.975	1.026
HABITAT	0.964	1.038	HABITAT	0.968	1.033
WORK	0.917	1.091	WORK	0.913	1.095
HOUSE	0.832	1.201	HOUSE	0.831	1.204
LOAN	0.921	1.086	LOAN	0.918	1.089
SFK (BIN)	0.758	1.319	SFK (scale)	0.520	1.925
OFK (BIN)	0.826	1.210	OFK (scale)	0.718	1.392
SKIP (BIN)	0.641	1.560	SKIP (scale)	0.464	2.156
OKIP (BIN)	0.733	1.363	OKIP (scale)	0.583	1.714
sPLAN	0.921	1.086	sPLAN	0.921	1.086
sATT	0.696	1.438	sATT	0.682	1.467
sENV	0.825	1.211	sENV	0.820	1.220
sCONT	0.668	1.497	sCONT	0.664	1.505

Appendix 6

Correlations Among the Variables

To understand how the variables in this study relate to each other, it is essential to consider their nature, whether they are quantitative, nominal, ordinal, or binary, as different measures are used accordingly:

- Person correlation coefficient, applied for quantitative variables,¹⁷ ranging from -1 and 1.
- Point-biserial correlation coefficient applied for quantitative with binary variables, ranging from -1 to 1.
- Tetrachoric correlation applied for binary variables, ranging from -1 to 1.
- Cramér's *V* applied to nominal variables, ranging from 0 (no association) to 1 (perfect association). It is based on Pearson's Chi-squared statistic.
- Eta-squared applied for a quantitative variable with a categorical one (nominal or ordinal) and interpreted as the shared variance. Values around 0.01, 0.06, and 0.14 refer to low, medium, and high.

Table of Person, point-biserial, and tetrachoric correlations

	AGE (Q)	EDU (Q)	CHILD (Q)	SIZE (Q)	LOAN (BIN)	OFK (BIN)	OKIP (BIN)	SFK (BIN)	SKIP (BIN)	sATT (Q)	sENV (Q)	sCONT (Q)	INCOME (Q)	SAVING (BIN)
AGE (Q)	1	-0.191***	-0.127***	-0.236***	-0.059*	0.048	0.045	0.028	0.059*	-0.033	-0.105***	-0.063*	0.125***	-0.125***
EDU (Q)		1	-0.007	0.003	-0.090***	0.227***	0.219***	0.260***	0.231***	0.130***	0.144***	0.183***	0.347***	0.230***
CHILD (Q)			1	0.538***	0.074**	-0.009	-0.027	0.012	-0.031	-0.015	-0.008	-0.054*	-0.003	0.023
SIZE (Q)				1	0.072**	-0.013	-0.015	0.026	0.001	0.002	0.007	-0.016	0.122***	0.016
LOAN (BIN)					1	-0.04	-0.13***	-0.02	-0.16***	0.016	0.000	-0.130***	-0.044	-0.18***
OFK (BIN)						1	0.46***	0.40***	0.40***	0.233***	0.093***	0.204***	0.219***	0.29***
OKIP (BIN)							1	0.46***	0.69***	0.108***	0.100***	0.133***	0.232***	0.36***
SFK (BIN)								1	0.40***	0.105***	0.087**	0.147***	0.249***	0.34***
SKIP (BIN)									1	0.073**	0.125***	0.196***	0.241***	0.44***
sATT (Q)										1	0.359***	0.509***	0.126***	0.218***
sENV (Q)											1	0.354***	0.180**	0.200***
sCONT (Q)												1	0.218***	0.306***
INCOME (Q)													1	0.249***
SAVING (BIN)														1

* The Pearson' correlation/tetrachoric correlation/biserial point correlation is significant at the 0.05 level (bilateral).

** The Pearson' correlation/tetrachoric correlation/biserial point correlation is significant at the 0.01 level (bilateral).

*** The Pearson' correlation/tetrachoric correlation/biserial point correlation is significant at the 0.001 level (bilateral).

Table of eta-squared coefficients

	ZONE (NOM9)	HABITAT (NOM3)	WORK (NOM3)	HOUSE (NOM4)	sPLAN (NOM3)
AGE (Q)	0.038*	0.002	0.434***	0.093**	0.007
EDU (Q)	0.019*	0.024*	0.062**	0.006	0.028*
CHILD (Q)	0.010	0.003	0.024*	0.032*	0.000
SIZE (Q)	0.024*	0.006	0.043*	0.019*	0.002
sATT (Q)	0.001	0.002	0.005	0.005	0.039*
sENV (Q)	0.010*	0.001	0.018*	0.004	0.009
sCONT (Q)	0.012*	0.004	0.007	0.018*	0.038*
INCOME (Q)	0.021*	0.012*	0.113**	0.043*	0.011
IV (Q)	0.008	0.010*	0.011*	0.002	0.000

* Eta-squared is between 0.010 and 0.060 (small effect size).

** Eta-squared is between 0.060 and 0.140 (medium effect size).

*** Eta-squared is greater than 0.140 (large effect size).

Table of V Cramer's coefficients

	ZONE (NOM9)	HABITAT (NOM3)	WORK (NOM3)	HOUSE (NOM4)	sPLAN (NOM3)
LOAN (BIN)	0.100	0.129***	0.089**	0.190***	0.015
OFK (BIN)	0.095	0.045	0.140***	0.125***	0.102***
OKIP (BIN)	0.087	0.043	0.150***	0.081*	0.112***
SFK (BIN)	0.103*	0.043	0.134***	0.095**	0.210***
SKIP (BIN)	0.095	0.062	0.135***	0.101**	0.189***
SAVING (BIN)	0.112*	0.036	0.193***	0.129***	0.251***
ZONE (NOM9)	—	0.271***	0.150***	0.105***	0.080
HABITAT(NOM3)	—	—	0.030	0.070*	0.055
WORK (NOM3)	—	—	—	0.204***	0.055
HOUSE (NOM4)	—	—	—	—	0.031

* V Cramer's coefficient is significant at the 0.05 level (bilateral).

** V Cramer's coefficient is significant at the 0.01 level (bilateral).

*** V Cramer's coefficient is significant at the 0.001 level (bilateral).

Appendix 7

Logistic Regressions Predicting Savings Behavior: Indices With Correct, Do Not Know and Incorrect Answers Used for Financial Knowledge Variables

	Model2_Ind	Mod2_IND	Mod5_Ind	Mod5_IND	Mod7_Ind	Mod7_IND
	Indices_1	Indices_3	Indices_1	Indices_3	Indices_1	Indices_3
INTERCEPT	-0.251	0.016	-0.872*	-0.542	-2.630**	-2.313**
AGE	-0.044**	-0.041**	-0.051**	-0.049**	-0.049**	-0.047**
SAGE	0.000	0.000	0.000	0.000	0.000	0.000
CAGE	0.000*	0.000*	0.000**	0.000**	0.000**	0.000**
EDU	0.229**	0.250**	0.140*	0.145*	0.107†	0.112†
CHILD	0.054	0.056	0.054	0.068	0.063	0.081
SIZE	-0.049	-0.045	-0.060	-0.060	-0.045	-0.048
ZONE—(REF.: MADRID)	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
HABITAT—(REF.: CAPITAL)	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
WORK—(REF.: EMPLOYED)	**	**	**	**	**	**
1. Retired	-0.317	-0.331	-0.425†	-0.436†	-0.477†	-0.489*
2. Unemployed ^a	-0.626**	-0.644**	-0.575**	-0.585**	-0.574**	-0.579**
HOUSE—(REF.: OWNED NO MORTGAGE)	**	**	**	**	**	**
1. Mortgage	0.049	0.057	0.054	0.064	0.074	0.081
2. Rent	-0.646**	-0.649**	-0.624**	-0.616**	-0.573**	-0.565**
3. Other	-0.497	-0.547†	-0.416	-0.442	-0.418	-0.451
LOAN	-0.458**	-0.448**	-0.407**	-0.412**	-0.375*	-0.388**
OFK (concepts)	0.351**	0.237**	0.419**	0.379**	0.285*	0.277**
OKIP (invest. products)			0.064**	0.049	0.079**	0.058†
SFK (concepts)			0.519*	0.533**	0.265	0.310†
SKIP (invest. products)			0.632**	0.586**	0.635**	0.562**
OFK*SFK (concepts)			-0.157*	-0.173**	-0.104	-0.128†
OKIP*SKIP (invest. prod.)			-0.027	-0.020	-0.038	-0.030
sPLAN—(REF: NO PLAN)					**	**
1. Check bank extracts					0.720**	0.739**
2. Budgeting					0.802**	0.806**
sATT					0.097	0.093
sENV					0.130†	0.128†
sCONT					0.339**	0.333**
Adjusted R-squared	0.197	0.180	0.254	0.241	0.322	0.312
n	1446	1446	1446	1446	1446	1446

Note: Results shown are the estimates of the regression coefficients and their significance.

Abbreviation: N.S. = not significant.

† $p < 0.10$.

* $p < 0.05$.

** $p < 0.01$.

^a Includes unemployed, student, or housewife/househusband.

Appendix 8

Instrumental Variable Regressions

Table A3 presents the results of regressions run for the subsample of respondents with university degree (547) using the endogenous composite index FINKNOW. The regressions included in the table are:

- Logistic regression (LOGIT) and OLS regression (OLS) in columns 1 and 4.

- Two steps of IV logistic regression (IV logit) in columns 2 and 3, using in first step FINKNOW as DV, and UNI_STUDIES as the instrument, and FINKNOW_PRED in 2nd step.
- 2SLS regression with STATA automatic procedure (IVregress command) needed to obtain the postestimation endogeneity tests, which are reported below Table A4.

TABLE A3 | IV regressions and LOGIT and OLS regressions for comparison reasons.

N (547)	LOGIT		IV logit—1st step		IV logit—2nd step		OLS		2SLS (IVregress)	
	Coeff.	p > z	Coeff.	p > z	Coeff.	p > z	Coeff.	p > z	Coeff.	p > z
INTERCEPT	-2.062	0.006	3.888	0.000	-1.896	0.157	-0.290	0.312	-0.299	0.546
UNI_STUDIES (IV)	—	—	0.270	0.000	—	—			—	—
AGE	-0.079	0.000	0.052	0.012	-0.076	0.001	-0.030	0.000	-0.030	0.000
SAGE	-0.001	0.219	-0.000	0.722	-0.001	0.259	0.000	0.648	0.000	0.639
CAGE	0.000	0.001	-0.000	0.452	0.000	0.001	0.000	0.007	0.000	0.005
CHILD	0.153	0.411	0.081	0.639	0.164	0.386	-0.058	0.372	-0.058	0.363
SIZE	0.074	0.565	0.086	0.499	0.080	0.543	-0.009	0.859	-0.009	0.855
ZONE		N.S.				N.S.		N.S.		N.S.
HABITAT (REF: CAPITAL)		N.S.				N.S.		N.S.		N.S.
WORK (REF: EMPLOYED)										
Retired	-0.278	0.573	-0.317	0.543	-0.306	0.534	-0.437	0.027	-0.436	0.025
Unemployed	-0.944	0.003	-0.769	0.021	-0.941	0.014	-0.539	0.000	-0.537	0.000
HOUSE (REF: OWNED NO MORTGAGE)										
Mortgage	-0.140	0.646	0.097	0.739	-0.085	0.781	-0.091	0.408	-0.091	0.397
Rent	-0.459	0.150	-0.406	0.205	-0.443	0.182	-0.142	0.241	-0.142	0.253
Other	0.301	0.706	-1.502	0.067	0.162	0.847	0.098	0.751	0.101	0.758
LOAN	-0.619	0.028	-0.661	0.027	-0.641	0.056	-0.296	0.009	-0.294	0.024
FINKNOW	0.153	0.001	—	—	—	—	0.057	0.001	—	—
FINKNOW_PRED	—	—	—	—	0.108	0.676			0.059	0.533
sPLAN										
Check bank extracts	0.908	0.004	0.615	0.046	0.918	0.008	0.104	0.373	0.103	0.411
Budgeting	0.876	0.002	0.779	0.005	0.856	0.011	0.241	0.023	0.240	0.054
sATT	0.0487	0.707	0.290	0.029	0.059	0.701	-0.028	0.577	-0.029	0.625
sENV	0.196	0.147	0.170	0.190	0.209	0.138	0.061	0.213	0.061	0.225
sCONT	0.429	0.002	0.318	0.024	0.423	0.007	0.395	0.000	0.394	0.000
Adj. R-squared	—		0.153		—		0.297		—	
R-squared	—		0.194		—		—		0.297	
Pseudo R-squared	0.208		—		0.187		0.261		—	

TABLE A4 | Postestimation results from the IVregress Stata command (obtained using the post-estimation command estat firststage after ivregress).

Tests of endogeneity					
H0: Variables are exogenous					
Durbin (score) Chi2(1)=0.000493				(p=0.9823)	
Wu-Hausman F(1, 518)=0.000467				(p=0.9828)	
First-stage regression summary statistics					
Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	F (1, 519)	Prob > F
FinKnow	0.1944	0.1525	0.0280	14.9404	0.0001
Minimum eigenvalue statistic = 14.9404					
Critical values			# of endogenous regressors: 1		
H0: Instruments are weak			# of excluded instruments: 1		
2SLS relative bias		5%	10%	20%	30%
			(Not available)		
		10%	15%	20%	25%
2SLS size of nominal 5% Wald test		16.38	8.96	6.66	5.53
LIML size of nominal 5% Wald test		16.38	8.96	6.66	5.53