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Financial Literacy: Evidence from Insurance, Savings, and Portfolio Choices in Italy

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Abstract

This thesis investigates the relationship between financial literacy, digital financial literacy, and individual investment behavior in Italy, with a particular focus on gender disparities and the emerging role of crypto-assets. Using data from the IACOFI 2023 survey and applying both linear and logistic regression models, the analysis explores how literacy levels influence ownership of insurance, pension funds, traditional financial instruments, and cryptocurrencies.

The results show that financial literacy is a strong predictor of insurance ownership and pension planning, while digital financial literacy appears to be more weakly associated with crypto-asset ownership than expected. Not surprisingly, both literacy dimensions are significantly influenced by socio-demographic factors, with education emerging as one of the strongest determinants. Gender disparities persist across all measures: women are consistently less likely to hold financial products, score lower on both literacy scales, and are significantly more prone to respond "I don't know" to financial knowledge questions, suggesting a confidence gap, apart from a knowledge gap.

To complement the regression analysis, a K-means clustering algorithm is employed to identify different financial profiles in the population. The resulting clusters: Cautious Traditionalists, Financially Passive individuals, and Diversified and Informed investors, differ in both financial behavior and socio-demographic aspects. These findings suggest that financial literacy is not only a tool for individuals to manage money, but also influences how they perceive and approach financial opportunities. In a financial world that is becoming increasingly complex, this makes financial literacy a key factor in not being afraid to interact with financial instruments.

The study concludes by emphasizing the systemic roots of gender inequality in financial knowledge and most importantly, access to financial knowledge, particularly in the Italian context where tertiary education rates remain low. It recommends early, universal financial education starting in middle school and policy efforts to create inclusive spaces for women in finance and STEM disciplines, both in education and in the workplace.

Keywords: financial literacy, household finance, insurance, savings, investment behavior, portfolio choices, cryptocurrency, gender differences

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Chapter 1

Introduction

In an era marked by economic uncertainty, aging populations and incredibly fast digital evolution, the ability to make informed financial decisions has become a necessary skill. Individuals are expected to plan for retirement, since government regulated pension systems aren't a guarantee anymore and protect themselves against financial risks, all while navigating a growing array of complex financial products and services, many of which are now accessible only through digital interfaces. Against this backdrop, financial literacy has been recognized as a critical determinant of individual well-being and macroeconomic stability. The concept of financial literacy has also evolved over time: from a narrow focus on numeracy and budgeting skills, it now encompasses behavioral attitudes, risk awareness and recently, the capacity to operate in digital financial environments as well.

This thesis investigates the role of both traditional financial literacy (FL) and digital financial literacy (DFL) in shaping key household financial decisions in Italy. Using microdata from the 2023 edition of the IACOFI survey ("Indagine sull'Alfabetizzazione Finanziaria e le Competenze di Finanza Digitale in Italia"), conducted by the Bank of Italy in collaboration with the OECD/INFE, the analysis explores how financial literacy influences participation in voluntary insurance, private pension funds, portfolio decisions (such as bonds, stocks, ESG funds, and cooperative loans) and ownership of cryptocurrencies. These questions were asked in order to capture variations in terms of risk exposure, time horizon, complexity, and digital complexity, offering comprehensive insights into the actual real-world implications of financial competence. Particular attention is paid to gender disparities, which continue to shape both literacy levels and financial behavior.

The Italian context offers a unique empirical setting. Despite recent policy efforts, Italy consistently ranks among the lowest-performing OECD countries in financial literacy assessments. According to the 2023 IACOFI survey, the average financial literacy score among Italian adults is 10.87 out of 20, well below the OECD benchmark of 15. More concerning, this figure has remained largely stagnant over the past decade, despite multiple waves of financial education initiatives. Moreover, substantial heterogeneity exists across gender, age, education, region, and occupational status. Women in particular lag behind men by 0.55 points on the total score, and the gap widens even further in the digital domain. Younger individuals and those with lower educational attainment also show lower proficiency, suggesting that current approaches to financial education are not reaching the groups that are most in need and that the Italian policy makers should focus on.

The measurement of financial literacy in this thesis follows the 2022 OECD/INFE Toolkit, which defines FL as a composite of three dimensions: financial knowledge, financial behavior, and financial attitudes. Knowledge is assessed through objective questions about inflation, interest compounding, and risk diversification. Behavior includes budgeting, timely bill payments and saving approaches. Attitudes capture how money is perceived by the individual and how much thought is put into future orientation. Digital financial literacy, the most recent addition to the toolkit, follows the same structure: digital knowledge as in awareness of digital fraud and legal status of cryptocurrencies, digital behavior like use of secure devices and checking platform regulation and finally digital attitude meant as risk perceptions of online transactions for example. All components are scored separately and then aggregated into a DFL index ranging from 0 to 10.

The first part of the empirical analysis describes the distribution of FL and DFL in the Italian adult population. Among the 4,862 respondents, the average knowledge score is 3.85 out of 7, while behavior and attitude components average 4.70 and 2.32 out of 9 and 4, respectively. DFL scores are lower overall, with a mean of 4.6 out of 10, and show higher variance by demographic group. Gender gaps are significant: women score lower in both FL and DFL, with particularly prominent differences in digital behavior. Interestingly, the attitudinal components of FL are more evenly distributed between genders, highlighting that much of the observed disparities consist of differences in behavior and knowledge but regarding attitude Italians behave pretty similarly.

These differences are not merely descriptive, they have behavioral implications. Logistic and probit regressions show that higher FL is positively and significantly associated with holding voluntary insurance and private pension products. For example, individuals in the top FL quartile are nearly twice as likely to own a pension fund compared to those in the bottom quartile. Insurance ownership follows a similar pattern. Education remains a strong predictor of both financial literacy and financial behavior, reinforcing the shared view that FL is a form of human capital in the form of education, especially tertiary education.

Gender remains a robust explanatory variable even after controlling for other characteristics. Women are less likely to hold insurance, pension funds, and a portfolio of investments even among those with comparable levels of literacy and income. Notably, women exhibit a greater tendency to respond “I don’t know” to financial knowledge questions, a behavior consistent with existing literature suggesting gendered differences in financial confidence bith rather than and apart from ability. These findings align with the broader international literature, including the works of Bucher-Koenen et al. (2017) and Lusardi and Mitchell (2011), which emphasize the need to differentiate between actual knowledge and self perceived knowledge in financial topics.

In terms of traditional portfolio choices, defined in this study as ownership of mutual funds, individual stocks, bonds, cooperative loans, or ESG-labeled products, financial literacy plays a key role, again. Among respondents with high literacy scores, the likelihood of holding any financial product, apart from crypto, is significantly higher. Interestingly, while FL is associated with greater investment participation overall, ownership remains relatively low across the sample, particularly among women and low-income respondents. Italians are not known to be avid investors. Bonds are the most commonly held investment, followed by stocks and mutual funds. Sustainable (ESG) investments and cooperative loans are still niche products, though they are slightly more popular among individuals with higher digital financial literacy.

The case of cryptocurrency ownership introduces a more complex dynamic. Although financial literacy is positively associated with more conventional financial behaviors, the relationship between FL and crypto adoption is weaker and more ambiguous. In fact, individuals with higher financial literacy are somewhat less likely to own crypto assets, suggesting a degree of skepticism or caution among the financially knowledgeable. Digital financial literacy, particularly the behavioral component, does show a modest positive correlation with crypto ownership, but the effect diminishes after accounting for sociodemographic controls. Age, self-employment, and male as gender emerge as stronger predictors. This indicates that the drivers of crypto adoption may lie more in behavioral and technological familiarity than in economic reasoning or financial knowledge.

These findings reflect broader debates in the literature about the nature of crypto markets. Studies such as those by Stix (2019) and Cascavilla (2024) have shown that crypto adoption is often driven by novelty-seeking behavior, technological enthusiasm, or perceived mistrust in traditional finance, all factors that are not captured by conventional literacy indices. An even simpler explanation, crypto is a trend, investors experience FOMO ("Fear Of Missing Out") and buy crypto just because everybody else is, again, something not captured by asking financial knowledge questions. The IACOFI data supports this view: while knowledge about the legal status of crypto assets is low across the board, ownership is concentrated among younger, male, and more digitally engaged individuals. This suggests that the decision to invest in crypto may not follow the same logic as decisions about pensions or insurance.

An important segment of this thesis is the inclusion of a clustering analysis to uncover patterns of financial behavior in the Italian landscape. Using K-means clustering on a standardized and imputed dataset, investor typologies are derived based on literacy scores, demographic traits, and financial decisions. The results reveal distinct profiles, ranging from digitally active but financially uninformed to high-literacy, risk-averse planners, that highlight the heterogeneous nature of financial engagement. This analysis accompanies and enriches the interpretation of the regression results and underlines the diversity of financial decision-making across the Italian population.

Taken together, the results of this thesis point to several key insights. First, traditional financial literacy remains a strong predictor of sound financial behavior, particularly in areas involving risk protection and long-term planning. Second, digital financial literacy, while essential for navigating modern financial ecosystems, is not yet a decisive factor in predicting investment decisions, though its importance is growing in areas such as platform use, digital security, and participation in ESG investments. Third, gender disparities in both literacy and behavior are persistent and multifaceted, requiring more targeted financial education interventions that go beyond knowledge transmission to address confidence, access, and structural inequalities.

Finally, the thesis highlights the importance of considering the interplay between financial and digital skills, demographic characteristics, and behavioral profiles in influencing financial decisions. As financial services become more digitized and decentralized, the need for a broader, more inclusive, and digitally responsive approach to financial education becomes more and more pressing. By integrating digital financial literacy into the broader framework of financial capability, this study contributes to a more comprehensive understanding of how individuals make financial choices in a rapidly evolving environment.

Chapter 2

Literature Review

2.1 Financial Literacy

2.1.1 Definition and Relevance of Financial Literacy

Financial literacy has become an essential component of economic capability in the 21st century. As financial markets have expanded in complexity, offering an increasing array of credit, investment, and insurance products, so has the necessity for individuals to possess the knowledge and skills required to navigate these markets and most importantly the financial products offered by these markets. The term "financial literacy" gained traction in policy and academia in the early 2000s, but the challenges it describes were evident even earlier. Bernheim (1995) was among the first to identify a widespread inability among adults to perform basic financial calculations, linking this deficit to inadequate retirement saving. Since then, financial literacy has been firmly established as a critical input to financial decision-making, with implications for personal welfare and macroeconomic stability.

The OECD defines financial literacy as "a combination of financial awareness, knowledge, skills, attitudes and behaviors necessary to make sound financial decisions and ultimately achieve individual financial well-being" [1]. In academic literature, Lusardi and Mitchell (2014) characterize financial literacy as a form of human capital that, similarly to education, is accumulated through time and guarantees long-term benefits [2]. As Jappelli and Padula (2013)[3] show in their dynamic model, literacy and wealth are jointly determined: investment in financial knowledge improves household returns and saving outcomes, but the outcome is naturally also shaped by resources and institutional context.

Several strategies have been developed to measure financial literacy. Early approaches, like those used in the U.S. Health and Retirement Study (HRS), focused on three simple questions assessing numeracy, inflation understanding, and interest compounding [4]. Van Rooij et al. (2011)[5] later extended this with a two-tiered measure: basic and advanced financial literacy, incorporating concepts such as risk diversification, bond pricing, and the role of financial markets.

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[1] OECD (2022), *OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion*, OECD Publishing.

[2] Lusardi, A. & Mitchell, O. S. (2014), *The Economic Importance of Financial Literacy: Theory and Evidence.* Journal of Economic Literature, 52(1), 5–44.

[3] Jappelli, T., & Padula, M. (2013), *Investment in financial literacy and saving decisions.* Journal of Banking & Finance, 37(11), 2779–2792.

[4] Lusardi, A. & Mitchell, O. S. (2011), *Financial literacy and retirement planning in the United States.* Journal of Pension Economics and Finance, 10(4), 509–525.

[5] van Rooij, M., Lusardi, A., & Alessie, R. (2011). *Financial literacy and stock market participation.* Journal of Financial Economics, 101(2), 449–472.

Cross-country efforts to standardize measurement resulted in the creation of the OECD/INFE Toolkit, which now guides national assessments in over 40 countries. This framework measures three dimensions: financial knowledge (based on correct answers to standardized questions), behavior (practices like budgeting and saving), and attitudes (e.g., time preferences). Each country computes a composite score from these components. Italy first implemented this model in the 2017 IACOFI survey by the Bank of Italy, and has updated it in 2020 and 2023.

In Italy, financial literacy has persistently lagged behind other developed nations. According to international comparisons such as SHARE, PISA, and OECD/INFE, Italy consistently ranks among the lowest in Europe, alongside Spain and Greece, on both knowledge and behavior components [6]. The most recent IACOFI survey (2023) reported an average financial literacy score of 10.7 out of 20, below the OECD threshold for minimum competency. The data also reveals significant demographic gaps: women score 0.4 points below men, and less educated individuals or under 35 years of age score markedly worse [7].

Theoretical models reinforce these empirical patterns. Jappelli and Padula (2015) propose two mechanisms by which financial literacy enhances financial performance: by improving returns (Model I) or by reducing participation costs (Model II). Both suggest that social security generosity lowers the incentive to invest in financial literacy and risky assets [8]. In addition, financial literacy is often endogenous, meaning it is both a cause and a consequence of factors such as income and education. For example, people who are wealthier and more educated tend to have higher financial literacy, but at the same time, being financially literate can help them manage their money better and build more wealth. This two-way relationship makes it difficult to determine what causes what, posing challenges to identify clear causal effects. At the same time, it highlights how financial capability is deeply rooted in broader social and economic structures.

Given this context, the primary objective of this thesis is to investigate how financial literacy influences financial decision-making in Italy. Using data from the 2023 IACOFI survey, we explore whether individuals with higher financial literacy scores are more likely to own a portfolio of investments, own insurance or pension products, and engage in cryptocurrency markets. We also examine how these behaviors vary between gender, age, and education. Finally, we will extract and analyze investor typologies that are most frequent in the Italian context. The analysis aims not only to uncover patterns but also to orient the design of potential policies that promote financial literacy through education and behavioral support, towards those most in need.

2.1.2 Measuring FL: The OECD/INFE Framework

The measurement of financial literacy has evolved together with the growing awareness of its importance for economic stability, retirement preparedness, and financial inclusion. While early studies focused primarily on numeracy and understanding of interest compounding, recent frameworks have expanded to include behavioral and attitudinal components as well. This evolution reflects a shift from viewing financial literacy as a purely 'academic' skill to understanding it as a broader sociological and behavioral characteristic.

Early measurement approaches, such as the influential “Big Three” questions, assessed basic numeracy, inflation, and risk diversification. These were later expanded by van Rooij et al.

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[6] Jappelli, T. & Padula, M. (2013), *Investment in financial literacy and saving decisions.* Journal of Banking & Finance, 37(11), 2779–2792.

[7] Lamboglia, S., Marinucci, M., Stacchini, M., & Vassallo, P. (2023). *Indagini sull'alfabetizzazione finanziaria e le competenze di finanza digitale in Italia: adulti.* Banca d'Italia.

[8] Jappelli, T. & Padula, M. (2015), *Investment in financial literacy, social security, and portfolio choice.* Journal of Pension Economics and Finance, 14(4), 369–411.

(2011)[9], who proposed a two-tiered system distinguishing between basic and advanced literacy, and demonstrating its predictive power for stock market participation.

The most widely adopted methodology for internationally comparable measurement is the OECD/INFE Toolkit, first developed in 2010 and revised multiple times (most recently in 2022). This framework was designed to give countries sound and uniformed rules for measuring financial literacy, financial inclusion, and financial well-being, and has become the standard for national surveys such as Italy's IACOFI survey[10].

The OECD/INFE framework defines financial literacy as a combination of three dimensions: knowledge, behavior, and attitudes. Each of these is captured through specific sets of questions. In the 2022 version of the Toolkit, financial literacy is scored as follows:

- **Financial Knowledge** (0–7 points): Based on seven technical questions covering interest compounding, inflation, risk diversification, and understanding of loan repayments. Each correct answer yields one point.
- **Financial Behavior** (0–9 points): Aggregates responses on budgeting, saving, avoiding over-indebtedness, comparing products, and tracking finances. Points are awarded for practices aligned with recommended financial management[11].
- **Financial Attitudes** (0–4 points): Derived from agreement with three attitudinal statements regarding long-term planning and saving preferences. The score is calculated as a rescaled average between 0 and 4[12].

The total score ranges from 0 to 20 and can optionally be normalized to a 0–100 scale. Notably, from 2022 onwards, the Toolkit recommends excluding the item "Money is there to be spent" to ensure international consistency across cultures and survey contexts.

Italy has adopted this model in its IACOFI surveys (2017, 2020, 2023), coordinated by the Bank of Italy. The 2023 survey applied the OECD scoring structure and added new modules on digital financial literacy. As mentioned before, results show an average financial literacy score of 10.7 out of 20, below the OECD benchmark of 15 and disaggregated results reveal wide disparities: women score 0.4 points lower than men, and younger adults and less educated individuals perform significantly worse[13].

These findings are consistent with prior research. Jappelli and Padula (2013)[14] documented Italy's persistent belowe average performance in both SHARE and WCY data. Their theoretical model explains how literacy and wealth evolve jointly, and how public pension generosity reduces incentives to invest in financial knowledge.

Jappelli and Padula (2015)[15] also distinguish two mechanisms through which financial literacy matters: by increasing returns (model I) or reducing entry costs (model II). These channels, along with empirical regularities, support the use of composite literacy scores in empirical work.

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[9] van Rooij, M., Lusardi, A., & Alessie, R. (2011). *Financial literacy and stock market participation.* Journal of Financial Economics, 101(2), 449–472.

[10] OECD (2022). *OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion.* OECD Publishing.

[11] OECD (2022), *OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion.*

[12] OECD (2022), *OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion.*

[13] Lamboglia, S., Marinucci, M., Stacchini, M., & Vassallo, P. (2023). *Indagini sull'alfabetizzazione finanziaria e le competenze di finanza digitale in Italia: adulti.* Banca d'Italia.

[14] Jappelli, T. & Padula, M. (2013). *Investment in financial literacy and saving decisions.* Journal of Banking & Finance, 37(11), 2779–2792.

[15] Jappelli, T. & Padula, M. (2015). *Investment in financial literacy, social security, and portfolio choice.* Journal of Pension Economics and Finance, 14(4), 369–411.

In this thesis, we adopt the OECD/INFE scoring methodology, using the 2023 IACOFI dataset. The primary objective is to test whether higher literacy scores total and by component correlate with better financial choices in the domains of investment, insurance, retirement saving, and crypto-asset ownership.

To provide an international benchmark, the following figure presents a comparison of average financial literacy scores, broken down by component, across countries participating in the OECD/INFE survey.

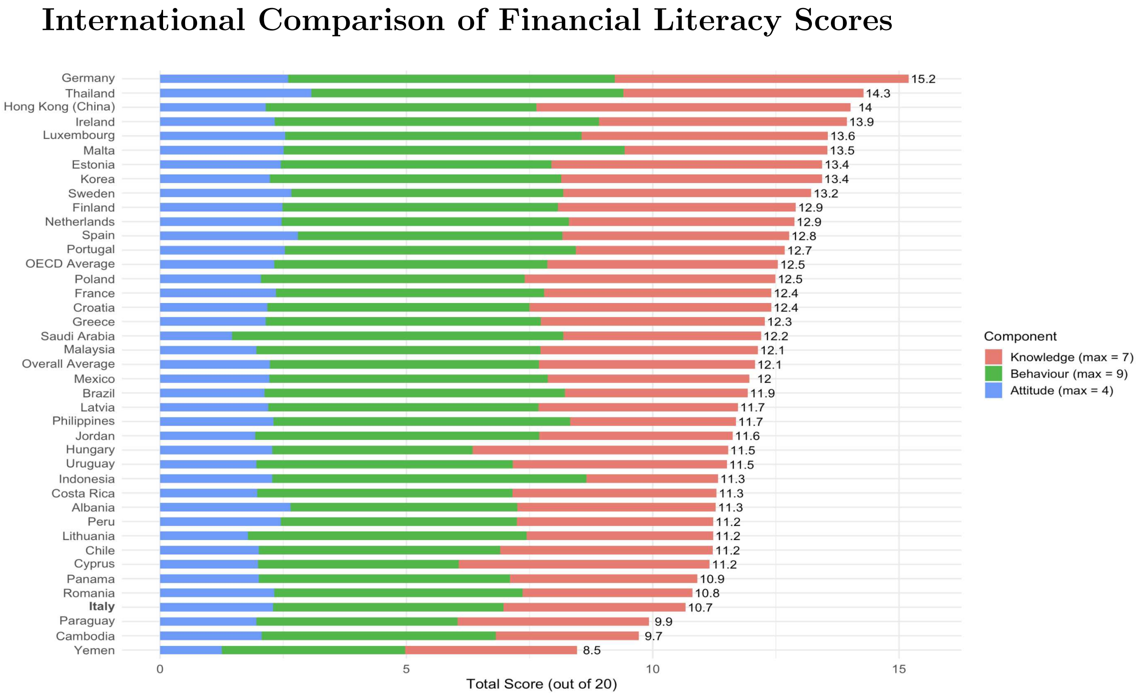

Figure 2.1: 2023 Average financial literacy scores across countries, based on the OECD/INFE 2022 framework. Scores are disaggregated into knowledge (max = 7), (max = 9), and attitudes (max = 4), and rescaled to a total of 20 points.

The figure above shows the total financial literacy scores across countries, calculated using the OECD/INFE 2022 scoring framework. The score ranges from 0 to 20 and aggregates the three components that were pointed out: financial knowledge, behavior, and attitudes. Both the OECD average and the overall sample average are included as benchmarks. The Italian score is highlighted to better showcase its placement with respect to other participating countries.

The data is based on harmonized national surveys and allow for robust cross-country comparisons and did, fortunately, not require substantial exclusions, as nearly all countries reported complete and therefore comparable results.

2.1.3 Trends in Financial Literacy in Italy (2017–2023)

While cross-country comparisons offer valuable international context, examining the evolution of financial literacy over time within a single country provides deeper insight into national dynamics and policy impact. In the case of Italy, the Bank of Italy has conducted three waves of the IACOFI survey in 2017, 2020, and 2023 using the OECD/INFE framework. This allows for a consistent and detailed analysis of how the three literacy components (knowledge, behavior and attitude) have developed over the six years.

The figure below presents average scores for each component by year. Values are computed according to the official scoring methodology adopted by the OECD and applied to the Italian context. Changes are expressed not only in absolute terms, but also in percentage points to better capture relative trends. The figure also highlights the summed financial literacy score for each year, annotated above the bars.

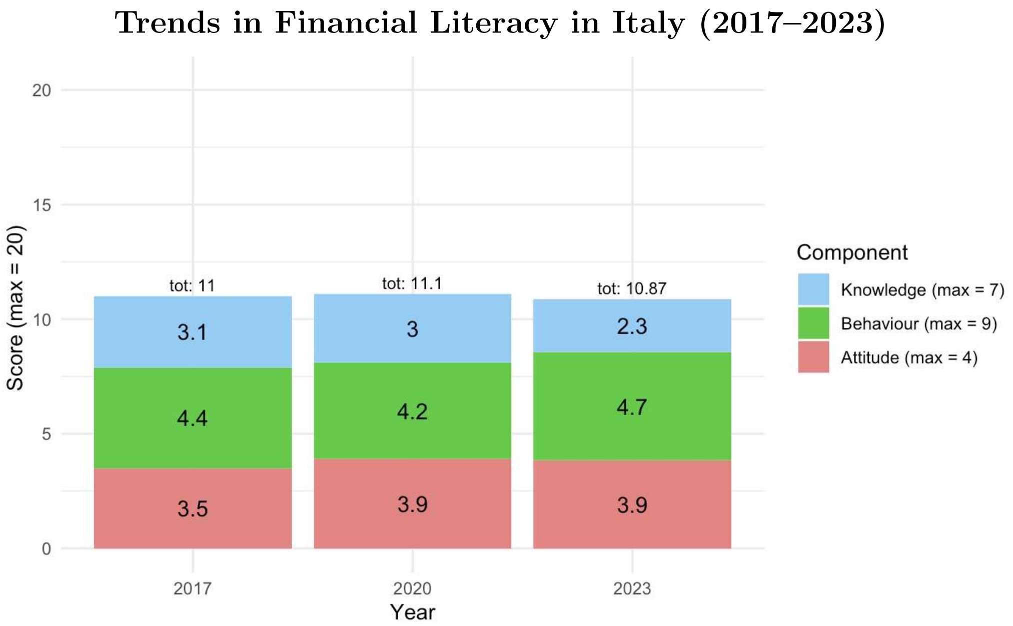

Figure 2.2: Evolution of financial knowledge, , and attitude scores in Italy based on the OECD/INFE methodology. Values are measured on a 0–20 scale, with subcomponent maximums of 7 (knowledge), 9 (), and 4 (attitude).

Sources: Banca d'Italia (2018), *Measuring the financial literacy of the adult population: the experience of Banca d'Italia*, Occasional Papers No. 435; Banca d'Italia (2020), *L'alfabetizzazione finanziaria degli italiani: i risultati dell'indagine della Banca d'Italia del 2020*; Banca d'Italia (2023), *Indagini sull'alfabetizzazione finanziaria e le competenze di finanza digitale in Italia.*

Note: The values reported for the years 2017 and 2020 are both taken from the 2020 OECD/INFE publication. As a result, the 2017 scores presented in this thesis may differ slightly from those reported in the original 2018 document. This choice was made to ensure consistency and comparability, as the 2020 publication applies updated score construction methods and presents the data in a more structured and transparent manner.

The 2023 values were obtained from our own calculations based on the raw dataset. These results may not match the exact values published in the 2023 Banca d'Italia report, due to rounding differences and methodological clarifications, elements that were also acknowledged by the authors in the original source.

Figure 2.2 illustrates the evolution of financial literacy scores in Italy from 2017 to 2023, based on the IACOFI survey conducted by the Bank of Italy. The composite score, following OECD/INFE methodology, aggregates three components: financial knowledge (max 7 points), financial (max 9 points), and financial attitude (max 4 points), for a total of 20 points.

Between 2017 and 2020, the overall financial literacy score increased from 11.0 to 11.1, and then to 10.9 in 2023. The financial knowledge component rose from 3.5 in 2017 to 3.9 in 2020 (+11.4%), before slightly declining to 3.85 in 2023 (−1.3%). Financial improved gradually, from 4.4 in 2017 to 4.2 in 2020 (−4.5%), and further increased to 4.7 in 2023 (+11.9% from 2020, +6.8%

from 2017). The attitude score showed a decreasing trend: 3.1 in 2017, 3.0 in 2020 (−3.2%), and a sharper drop to 2.32 in 2023 (−22.7% from 2020, −25.2% from 2017).

These patterns highlight that while knowledge and behavior have either improved or remained stable, attitudes toward long-term financial planning and saving have deteriorated substantially in recent years, likely reflecting changing economic conditions and perceived financial vulnerability among Italian households.

2.2 Digital Financial Literacy

The increasing digitization of financial services has led scholars to develop the concept of digital financial literacy (DFL), defined as the ability to access, understand, and manage financial services through digital technologies. DFL extends the concept of traditional financial literacy by incorporating digital skills such as navigating online banking platforms, recognizing digital fraud, and using mobile applications for payments or budgeting.

Institutional efforts to conceptualize and measure DFL have been led by the OECD/INFE, whose 2022 toolkit introduces a complex but complete framework including digital knowledge, digital attitudes, and digital behaviors . These elements are typically measured through a combination of self-assessment and objective knowledge questions.

The IACOFI 2023 dataset implements the OECD/INFE methodology and constructs composite scores for digital knowledge, digital behavior, and digital attitudes. It employs psychometric techniques, including principal component analysis and factor analysis, to validate the internal structure of the DFL constructs . The data show substantial heterogeneity in DFL across demographic groups. For instance, only 27% of respondents over age 60 report confidence in using digital banking, compared to 74% among individuals aged 18–29. Probit and OLS regressions reveal that DFL is significantly associated with educational attainment, income level, and digital access. Even when controlling for these factors, women score on average 0.3 standard deviations lower than men on the overall DFL index.

Complementary evidence comes from Koe et al. (2023), who analyze DFL and its impact on financial resilience in a Malaysian sample using structural equation modeling (SEM) . In their model, DFL is treated as a latent variable reflected in digital banking usage, mobile transactions, and confidence in online financial environments. The study finds that DFL significantly predicts both financial behavior ($\beta = 0.47$, $p < 0.001$) and financial resilience ($\beta = 0.33$, $p < 0.01$), highlighting the role of digital competencies in economic well-being. Model fit statistics (CFI = 0.95, RMSEA = 0.048) support the robustness of the SEM approach.

Although DFL is still an emerging area of research, the integration of digital skills into financial capability assessments has become increasingly important particularly in light of innovations like cryptocurrency trading, algorithmic investing, and mobile-based credit services. The application of the IACOFI dataset in this thesis contributes to this growing literature by offering a detailed examination of how DFL interacts with investment behavior in the Italian context.

2.2.1 Definition and Relevance of Digital Financial Literacy

Digital financial literacy (DFL) has emerged as a key competence in modern economies where access to financial services is increasingly mediated by digital technologies. While closely related to digital literacy, which generally refers to the ability to use and understand digital tools such as web browsers, email, and apps, digital financial literacy refers more specifically to the ability to use those tools safely and effectively in financial contexts. According to the OECD, DFL consists of "a combination of knowledge, skills, attitudes and behaviors necessary for individuals to be aware of and safely use digital financial services and digital technologies with a view to contributing to their financial well-being" [16].

The scope of DFL spans a range of domains. It includes the technical capacity to navigate online banking interfaces, payment platforms, and mobile finance apps, but it also covers deeper forms of understanding and critical awareness. This includes recognising signs of fraud, protecting personal data and credentials, evaluating the legitimacy of online financial services, and understanding emerging tools like cryptocurrencies, AI advisors, and digital wallets. Attitudinally, DFL involves awareness of one's own knowledge limits, willingness to adopt secure practices, and a critical mindset when engaging with online offers and financial advice. As financial services continue to shift online, these capabilities have become essential not just for convenience, but for protection against scams, excessive fees, and exclusion.

The importance of DFL has grown significantly in recent years. The COVID-19 pandemic accelerated the digitalisation of many financial services ranging from contactless payments to app based lending, raising the urgency of digital readiness. However, higher digital usage has also been accompanied by increased exposure to online fraud, identity theft, and behavioral manipulation via targeted advertising. Research has shown that consumers with low DFL are more likely to fall victim to financial scams, pay higher fees, or become over-indebted through mismanagement of online credit services [17]; individuals with strong DFL, on the other hand, tend to make more informed and confident financial choices, and are better equipped to evaluate the risks and benefits of new digital tools [18].

Italy's performance in digital financial literacy reflects broader digitalisation challenges. Although digital infrastructure and internet penetration have improved in recent years, Italy continues to rank below the EU average in both digital and financial capabilities. According to the 2023 IACOFI survey conducted by the Bank of Italy, the average digital financial literacy score was 4.6 out of 10. Performance varied significantly across domains and demographics. Respondents scored highest on behavioral items, such as reporting safe password habits or using secure devices but substantially lower on knowledge and attitudinal components. Notably, two-thirds of respondents incorrectly believed that crypto-assets have the same legal status as national currencies, and nearly half were unaware that their online behavior may be used for commercial profiling [19].

Demographic gaps in DFL are also evident. As with traditional financial literacy, men, individuals aged 35 and older, and those with university degrees scored significantly higher than other groups. Young adults under 35 and individuals with lower education levels showed especially low levels of digital financial knowledge and risk awareness [20]. These disparities raise concerns about

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[16] OECD (2022). *OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion.* OECD Publishing.

[17] OECD (2022). *OECD/INFE Guidance on Digital Delivery of Financial Education.* OECD Publishing.

[18] Koe, W.-L., Omar, R. M. N., & Abdullah, R. A. (2023). *The Impact of Digital Financial Literacy on Financial Behavior and Resilience. Competitiveness Review.*

[19] Lamboglia, S., Marinucci, M., Stacchini, M., & Vassallo, P. (2023). *Indagini sull'alfabetizzazione finanziaria e le competenze di finanza digitale in Italia: adulti.* Banca d'Italia.

[20] Banca d'Italia (2023). *Risultati dell'indagine sull'alfabetizzazione finanziaria degli adulti: edizione 2023.*

unequal access to secure and effective use of digital financial tools and the potential for increased vulnerability among certain segments of the population.

Although digital financial literacy is not the primary focus of this thesis, its inclusion is essential to understanding how individuals interact with financial technologies and how digital tools shape financial decisions. In particular, as we investigate phenomena such as cryptocurrency investment and online product adoption, DFL provides a critical contextual lens for interpreting behavioral patterns and access barriers. The following section describes in more detail how digital financial literacy is measured in the IACOFI 2023 dataset.

2.2.2 Measuring DFL: The OECD/INFE Framework

Digital financial literacy is measured in the OECD/INFE 2022 framework as a composite indicator capturing three core dimensions: knowledge, behavior, and attitudes, specifically as they relate to digital financial environments. The score was developed to complement the traditional financial literacy index and provides insight into how well individuals understand and navigate online financial tools and services [21].

The digital financial literacy score ranges from 0 to 10 and is composed of the following three components:

- **Digital Knowledge** (0–3 points): Assessed through three true/false questions on digital financial concepts. These include understanding the legal distinction between crypto-assets and fiat currency, the value and enforceability of digital contracts, and the commercial profiling risks associated with online data sharing.[22]
- **Digital behavior** (0–4 points): Based on four survey items that assess secure and responsible online financial behaviors. Points are awarded for good practices such as regularly changing passwords, verifying the regulatory status of online providers, avoiding password sharing, and being cautious with sharing financial information on social media.[23]
- **Digital Attitudes** (0–3 points): Derived from three attitudinal statements regarding online safety and personal responsibility. These items assess the respondent's awareness of online risk factors such as using public Wi-Fi for financial transactions, evaluating website security, and the importance of reading terms and conditions before making digital purchases.[24]

Each component is scored independently, and the total score is calculated by simple aggregation. The composite index therefore ranges from 0 (no demonstrated digital financial literacy) to 10 (full marks in all three dimensions). The OECD also allows for optional normalisation of the score to a 0–100 scale for international comparison, though this was not adopted in the Italian national implementation.

In the IACOFI 2023 survey, conducted for the first time using the updated OECD/INFE methodology, Italian adults recorded an average digital financial literacy score of 4.6 out of 10. Subscores showed a stronger performance in behavioral practices (average 2.1/4), while knowledge (1.3/3) and attitudes (1.2/3) remained weaker. For instance, around 66% of respondents incorrectly believed that crypto-assets have the same legal standing as money, and a similar share underestimated the importance of reading the terms and conditions when engaging in online financial transactions [25]. The score distribution revealed demographic disparities: DFL was higher among older adults (35+), university graduates, and residents of Northern regions, while younger individuals, women, and respondents with lower levels of education tended to score lower [26]. These patterns mirror those found for traditional financial literacy and reflect a broader digital divide in Italy.

Overall, the DFL score provides a structured and evidence-based way of evaluating how equipped individuals are to function in digital financial environments. It also serves as a valuable benchmark for comparing digital financial competencies across countries and over time.

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[21] OECD (2022). *OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion.* OECD Publishing.

[22] OECD (2022). *OECD/INFE Toolkit for Measuring Digital Financial Literacy.* Paris: OECD Publishing.

[25] Lamboglia, S., Marinucci, M., Stacchini, M., & Vassallo, P. (2023). *Indagini sull'alfabetizzazione finanziaria e le competenze di finanza digitale in Italia: adulti.* Banca d'Italia.

[26] Banca d'Italia (2023). *Risultati dell'indagine sull'alfabetizzazione finanziaria degli adulti: edizione 2023.*

International Comparison of Digital Financial Literacy Scores

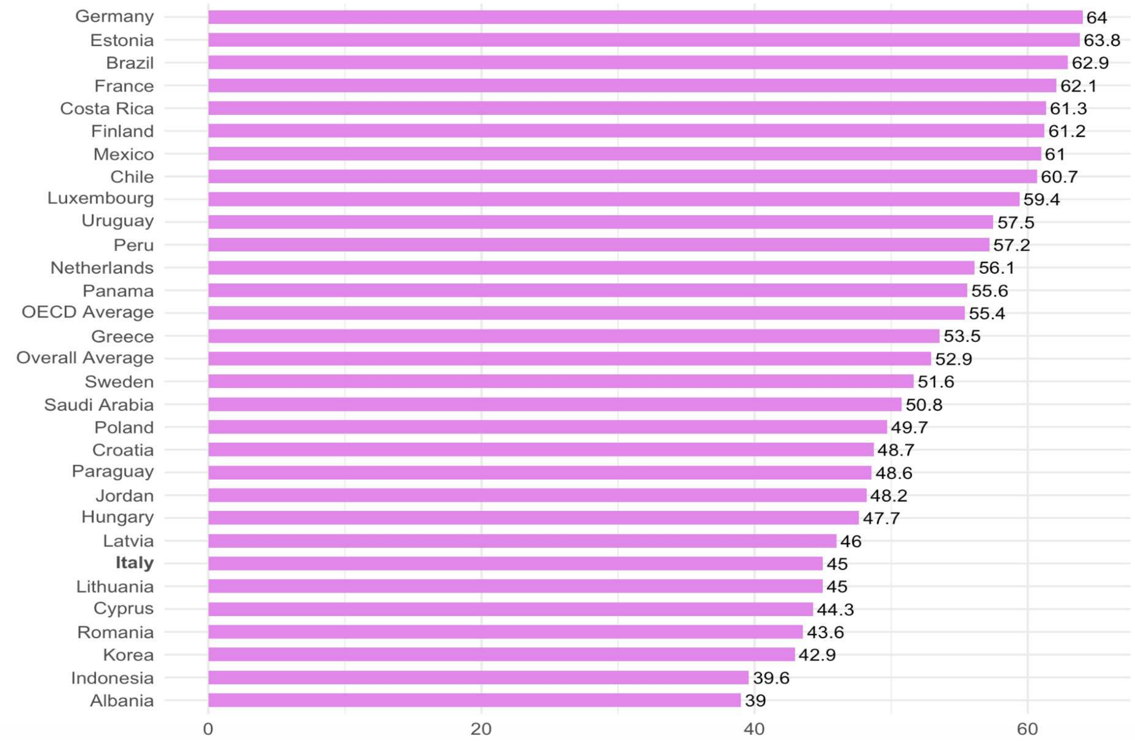

Figure 2.3: Total digital financial literacy scores across countries. Scores range from 0 to 10 and are based on the OECD/INFE 2022 methodology. Italy is highlighted for emphasis.

The following figure presents total digital financial literacy scores across countries, based on the OECD/INFE 2022 methodology. The values are scored on a 0 to 10 scale and represent the aggregate of digital knowledge, behavior, and attitude components. The chart includes both the OECD average and the overall sample average as reference points.

It is important to note that a number of countries are excluded from the figure. In some cases, digital financial literacy scores were not reported, while in others the measurement was limited to adults with internet access only, which reduces comparability and could introduce selection bias. To maintain consistency and validity, such countries were omitted from the international comparison.

2.3 Evidence from literature

One of the most influential empirical contributions to the study of financial literacy is Van Rooij, Lusardi, and Alessie (2011), who examine the relationship between financial literacy and stock market participation using data from the Dutch DNB Household Survey (DHS), a large panel containing information on demographics, income, wealth, and financial attitudes . The authors construct two indices: a *basic financial literacy* index based on questions about interest compounding, inflation, and risk diversification, and an *advanced financial literacy* index covering topics such as the function of stock markets, the relationship between bond prices and interest rates, and the concept of the equity premium. Using probit and instrumental variable (IV) probit models, they show that advanced financial literacy has a statistically significant effect on stock market participation. Specifically, an increase of one standard deviation in the advanced literacy score is associated with an 8 percentage point increase in the probability of holding stocks. The IV estimation strategy uses parental education and numeracy scores as instruments to address endogeneity concerns. The authors also perform a set of robustness checks including alternative model specifications and subsample analyses, finding consistent results. One limitation of their approach, however, is potential measurement error in the financial literacy indices, as self-reported answers may be affected by framing or guessing behavior.

Lusardi and Mitchell (2011) provide complementary evidence using data from the U.S. Health and Retirement Study (HRS), focusing on older individuals nearing retirement . They develop a concise but powerful battery of three questions (commonly referred to as the "Big Three") designed to capture knowledge of interest compounding, inflation, and risk diversification. Their findings reveal that only about 30% of respondents can answer all three questions correctly, with women and individuals with lower education levels performing significantly worse. Through regression analysis, they show that financial literacy is strongly and positively associated with retirement planning. In particular, individuals who score correctly on all three questions are over 20 percentage points more likely to have planned for retirement, even after controlling for income, education, and cognitive ability. While their cross-sectional design limits causal inference, the authors mitigate concerns by including proxies for time preference and numeracy.

To endogenize the acquisition of financial knowledge, Jappelli and Padula (2013) propose a life-cycle model in which individuals invest in financial literacy to improve their future returns on wealth . The model features an intertemporal optimization framework where literacy accumulation affects the return on savings, which in turn influences consumption and investment behavior. Calibrated to European data, their simulations suggest that individuals with steeper income profiles invest more in literacy early in life. The empirical component relies on panel data from SHARE (Survey of Health, Ageing and Retirement in Europe), and uses education and parental background as instruments. The estimated elasticity of stockholding with respect to financial literacy is approximately 0.3, and the marginal effect of a one-unit increase in financial literacy raises the probability of holding stocks by 5 to 7 percentage points. They test model robustness by altering the parameters for the cost of acquiring literacy and for the return differential between risky and safe assets. A major strength of the paper lies in its integration of theory and empirics, though the model abstracts from institutional frictions like transaction costs or limited access to financial advice.

2.3.1 Insurance Decisions

Insurance decisions, particularly concerning life insurance, are strongly linked to household risk preferences and intertemporal financial planning, making them an important area for investigating the effects of financial literacy (FL) and digital financial literacy (DFL). Theoretical models rooted in the life-cycle model, notably the extension proposed by Lewis (1989), incorporate the utility of dependents to explain the demand for life insurance as an instrument for income replacement and bequest . Earlier empirical work, such as Hammond et al. (1967), also highlights that risk aversion, income, number of dependents, and age are significant predictors of life insurance ownership .

In the Italian context, Fornero and Monticone (2011) conduct one of the most detailed empirical studies on the relationship between financial literacy and participation in private pension plans and insurance contracts. Using the Bank of Italy's SHIW dataset, they employ probit models to estimate the marginal effects of financial literacy on the probability of holding a supplementary pension plan or life insurance. Their results show that a one-standard-deviation increase in financial literacy raises the likelihood of pension participation by about 7 percentage points, even after controlling for income, age, education, employment status, and risk aversion. Their robustness checks include specifications with cognitive ability, self-reported planning propensity, and attitudes toward financial intermediaries. However, they acknowledge that endogeneity between FL and financial behavior cannot be ruled out due to the cross-sectional nature of the data.

Luciano, Outreville, and Rossi (2014) take a microeconomic and gender-sensitive approach by analyzing data from the 2012 SHIW to estimate both the probability of purchasing life insurance and the willingness to pay for it. They use logit and Heckman selection models to correct for sample selection bias in estimating expenditures. Their results confirm that financial market proximity, proxied by home ownership, stockholding, and holding of managed portfolios, is a strong predictor of both insurance participation and premium amounts. The probability of owning life insurance is positively associated with higher education and employment status. Women, however, are consistently and significantly less likely to be insured, even when accounting for these controls. One novel contribution of their study is the inclusion of proxies for financial inclusion and risk diversification, interpreted as indirect measures of financial literacy.

Millo and Carmeci (2014) approach the topic from a macro-spatial perspective, examining subregional variations in life insurance consumption across Italian provinces between 2000 and 2010. They construct a balanced panel dataset and apply spatial econometric models, specifically, the Spatial Autoregressive Model (SAR) and Spatial Error Model (SEM), to account for spatial dependence and serial correlation. Key findings include the positive influence of income per capita, education levels, and the share of young dependents on life insurance density. Notably, education exhibits a nonlinear relationship: in provinces with higher income, the marginal effect of education on insurance demand becomes negative, suggesting that more educated individuals may substitute toward other financial instruments. They test robustness using alternative specifications and spatial lags, and highlight that failing to account for spatial dependence leads to overestimated standard errors and biased coefficients.

From a theoretical lens, Schlesinger (1981) models the choice of insurance contracts with deductibles and demonstrates that individuals with higher risk aversion or lower wealth prefer lower deductibles. His framework connects optimal insurance design to utility maximization under uncertainty and shows that even small changes in perceived risk or premium structure can shift coverage preferences. While not empirically tested in the Italian case, this framework offers useful intuition when interpreting real-world behaviors in relation to FL and contract complexity.

Recent data from the IACOFI 2023 survey adds a modern dimension by incorporating digital financial literacy (DFL) into the analysis of insurance participation. Respondents were assessed across three DFL domains: digital knowledge, digital behavior, and digital attitudes. The data show that individuals in the highest DFL quartile are 1.6 times more likely to report owning non-mandatory life insurance products compared to those in the lowest quartile. Multivariate probit regressions confirm the significance of DFL even after controlling for age, gender, education, income, and digital access. In particular, digital behavior, capturing actions such as comparing insurance policies online and verifying sources, is the strongest predictor within the DFL index. These results suggest that digital competence operates as an independent enabler of insurance access and decision-making, especially as digital distribution becomes the norm.

Institutional findings from IVASS (2023) reinforce these insights: over 40% of uninsured respondents cite lack of knowledge about insurance products or lack of trust in the system as the primary reasons for non-participation. Additionally, difficulties in navigating digital interfaces and comparing contracts online are increasingly common deterrents among older and less digitally literate individuals. These barriers mirror those highlighted by the ANIA (2013) report, which also notes significant regional disparities in life insurance coverage, with northern regions far exceeding the south in both penetration rates and product diversification.

Taken together, these findings demonstrate that both financial literacy and digital financial literacy are crucial and often complementary factors in understanding life insurance participation. Financially and digitally literate individuals are better equipped to understand policy conditions, evaluate trade-offs such as deductibility, and navigate increasingly digital channels of acquisition and management. The literature consistently shows that the lack of either form of literacy contributes to under-insurance, market segmentation, and missed opportunities for household risk protection.

2.3.2 Pension Fund Investment

Participation in voluntary pension schemes represents a critical household decision with long-term financial consequences. Given the complexity and forward-looking nature of retirement planning, it is a domain particularly sensitive to both financial literacy (FL) and digital financial literacy (DFL). A growing body of empirical work has demonstrated that more financially literate individuals are significantly more likely to participate in pension plans, diversify retirement savings, and engage with pension providers in a proactive manner.

Fornero and Monticone (2011) analyze supplementary pension plan participation in Italy using the SHIW dataset and estimate probit models to determine the marginal effects of financial literacy on pension saving decisions. Their results show that financial literacy increases the probability of participating in supplementary pension schemes by approximately 7 percentage points. This effect remains robust when controlling for cognitive abilities, income, age, education, trust in financial intermediaries, and risk aversion. Interestingly, the authors also note that higher levels of education alone are not sufficient predictors of participation without the mediating role of financial knowledge. The authors acknowledge, however, that due to the cross-sectional nature of the data, reverse causality and unobserved heterogeneity remain potential threats to causal inference.

Jappelli and Padula (2015) explicitly address the endogeneity between financial literacy and pension saving by developing a simultaneous equations framework where financial literacy and retirement wealth are jointly determined. Using data from the Survey of Health, Ageing and Retirement in Europe (SHARE), they estimate a system of equations using three-stage least squares (3SLS). Their findings indicate that a one-standard-deviation increase in financial literacy is associated with a 10–13% increase in retirement wealth accumulation. Conversely, they also find that individuals with higher anticipated pension wealth are more likely to invest in acquiring financial knowledge, confirming the presence of bidirectional causality. The model is tested for robustness across different age groups and with alternative instruments, including parental education and regional schooling indicators.

Millo and Camerci (2014) investigate the determinants of regional variation in pension fund participation across Italy using panel data and a subregional econometric approach. They apply a fixed-effects panel regression using data aggregated at the NUTS-3 level from 2000 to 2011. Their analysis confirms that financial literacy, as proxied by average education levels and labor force attachment, is positively associated with pension uptake. The authors also identify a strong North–South divide: while regions in Northern Italy show high coverage rates and diversification across pension instruments, Southern provinces lag significantly, partially due to both structural factors (e.g., informal labor markets) and lower FL levels. They emphasize that pension policy interventions must be tailored to account for regional heterogeneity.

Luciano, Outreville, and Rossi (2014), while primarily focused on life insurance, also provide insights into pension participation through a gender lens. Their analysis of SHIW 2012 shows that women's lower likelihood of purchasing pension products persists even after controlling for income and employment status, suggesting a potential role for gendered differences in financial literacy. In a series of logit regressions, they find that the probability of holding a pension fund increases by 5 to 8 percentage points for individuals who own other financial assets, such as stocks or mutual funds again pointing to a correlation between financial sophistication and long-term savings behavior.

In recent years, digital tools have become increasingly relevant in pension decision-making. The OECD (2021) and OECD/INFE (2022) highlight that online pension portals, mobile apps for portfolio tracking, and digital enrollment mechanisms have become key touchpoints for consumers. However, these tools require users to navigate complex interfaces and interpret long-horizon financial projections. DFL plays a crucial role here: low digital competence can lead to underutilization of available pension options or complete non-participation.

The IACOFI 2023 survey provides empirical evidence on the link between DFL and pension fund participation in Italy. The data reveal that among individuals aged 30–59, those scoring in the top quartile of the DFL distribution are nearly twice as likely to be enrolled in a voluntary pension plan compared to those in the bottom quartile. A probit model estimated on this subsample confirms that digital behavior measured via actions like consulting online pension simulators, comparing long-term fees, or reviewing risk-return projections has a statistically significant effect ($p < 0.01$) even after controlling for education, income, and employment status. Digital knowledge, while positively correlated, loses statistical significance once behavior is included, suggesting that active use of digital tools, rather than mere awareness, drives pension decisions.

In summary, the literature strongly supports the role of both financial and digital financial literacy in influencing pension fund participation. Financial literacy affects retirement outcomes through increased awareness of long-term risks and better evaluation of contribution strategies, while digital competence enables individuals to access, interpret, and act upon pension-related information. The evidence from Italy is consistent with international findings and underscores the need for integrated financial education and digital inclusion strategies in pension reform policies.

2.3.3 Portfolio Choices

Understanding household participation in traditional financial investments, such as mutual funds, stocks, bonds, cooperative loans, and ESG-focused products, has long been a central concern in household finance. A consistent finding across empirical studies is that financial literacy (FL) significantly increases both the likelihood and complexity of investment behavior. In recent years, digital financial literacy (DFL) has emerged as a further determinant of market participation, as more investment platforms and products are delivered via digital channels.

Van Rooij, Lusardi, and Alessie (2011) provide one of the seminal empirical studies on this topic, using data from the Dutch DNB Household Survey (DHS). They construct both basic and advanced financial literacy indices and estimate probit and instrumental variable probit models to determine the effect of literacy on stock market participation. Their results show that a one-standard-deviation increase in advanced financial literacy is associated with an 8 percentage point increase in the probability of owning stocks. The authors instrument financial literacy using parental education and numeracy scores to account for potential endogeneity. They also test robustness using alternative specifications and subsamples, finding consistent results across groups. The study concludes that lack of advanced financial knowledge is one of the main barriers to entry in financial markets.

Guiso, Sapienza, and Zingales (2005) examine trust as a determinant of stock market participation in the context of financial literacy and cultural factors. Using cross-sectional data from the Bank of Italy's SHIW, they find that lack of trust in financial intermediaries explains up to 50% of the non-participation in the stock market. The authors use ordered probit models and incorporate regional fixed effects to account for spatial variation in trust and financial infrastructure. Their findings show that low financial literacy, particularly when combined with high perceived risk or uncertainty, amplifies mistrust and leads to underinvestment in risky assets.

Guiso, Haliassos, and Jappelli (2002) explore household stockholding across Europe and highlight the persistently low participation rates, particularly in Southern European countries. They use microdata from national household surveys, including Italy's SHIW, and estimate linear probability models to identify the role of financial education, wealth, and institutional access. Their results emphasize that financial literacy is a necessary condition for stockholding but not a sufficient one in contexts with institutional or informational frictions.

Gomes, Michaelides, and Polkovnichenko (2009) develop a life-cycle consumption and portfolio choice model to explain limited stock market participation. Their model includes non-tradable labor income, fixed participation costs, and heterogeneity in risk aversion. The calibrated model is able to match empirical participation rates when assuming that a subset of households has low or no financial literacy, which inhibits their ability to assess risk-return trade-offs. This theoretical insight reinforces the role of FL as both a behavioral and informational barrier to market entry.

Jappelli and Padula (2013) propose a dynamic model of financial literacy investment over the life cycle and find that more financially literate individuals not only save more but are more likely to allocate savings into higher-yielding instruments, including stocks and mutual funds. Their empirical implementation using SHARE data shows that the elasticity of stockholding with respect to financial literacy is approximately 0.3. These results highlight that financial literacy influences not only the decision to participate but also the intensity and structure of investment portfolios.

Luciano, Outreville, and Rossi (2014) analyze Italian household decisions regarding life insurance and financial investment products using the 2012 SHIW. Their results show that ownership of investment funds, bonds, and equity shares is positively associated with variables correlated to financial literacy, such as higher education, employment stability, and home ownership. In particular, their Heckman selection model shows that holding investment funds increases the probability of also owning life insurance by 7–9 percentage points, suggesting complementary financial behavior among more literate households.

Recent evidence from IACOFI 2023 confirms that digital financial literacy also plays a significant role in investment participation. Respondents with higher DFL scores are substantially more likely to report ownership of traditional financial assets. Specifically, among respondents aged 30–59, those in the top DFL quartile are over twice as likely to hold mutual funds or equity products. Probit models confirm that digital behavior measured via online trading, use of robo-advisors, or comparison of fund fees is the most significant component of DFL in predicting investment participation. These effects remain statistically significant at the 1% level, even after controlling for socioeconomic variables.

Finally, ESG and sustainable portfolio choices are an emerging class of financial products that require relatively high levels of investor literacy, given the complexity of assessing environmental impact metrics and fee structures. While research on this is still limited, initial findings from the IACOFI dataset show that sustainable investment is positively correlated with digital behavior and attitudes, suggesting that both FL and DFL may jointly influence adoption of ESG products.

In conclusion, traditional investment participation is consistently and significantly influenced by financial literacy and increasingly by digital competencies. Low FL and DFL act as both informational and psychological barriers, reducing both access and engagement with investment opportunities. The empirical evidence suggests that policies aimed at expanding market participation should integrate financial education with digital literacy initiatives, particularly for disadvantaged groups and late adopters.

2.3.4 Cryptocurrency Ownership

Cryptocurrencies have emerged as a novel and highly volatile financial instrument that poses new challenges for individual investors. Unlike traditional investments, crypto-assets are often accessed through digital platforms, lack institutional regulation, and require specific knowledge about blockchain technology, wallet management, and digital security. As such, both financial literacy (FL) and digital financial literacy (DFL) are expected to play a central role in shaping crypto ownership and behavior. However, the literature suggests that the nature of this relationship is more complex than in traditional finance.

Stix (2019) provides one of the earliest empirical studies on crypto adoption using survey data from Austria. His findings indicate that actual ownership of crypto-assets is low (1.5–2.5% of the population), while the share of individuals intending to purchase cryptocurrencies in the near future is substantially higher (around 5–6%). Importantly, those with a high self-assessed understanding of finance are significantly more likely to hold crypto-assets, although their actual objective financial literacy scores do not differ markedly from the general population. This suggests that perceived financial competence may drive speculative behavior in the crypto market. The study also uses multinomial logit models and includes variables such as age, income, education, trust in institutions, and familiarity with digital payments.

Bannier, Schwarz, and Heimer (2019) focus on gender differences in Bitcoin investment and introduce the concept of "Bitcoin literacy," a composite measure based on questions about cryptocurrency fundamentals, blockchain architecture, and risk. Using survey data from Germany, they find that men are significantly more likely to hold Bitcoin and that actual and perceived financial literacy account for up to 42.6% of the gender gap in crypto ownership. Their regression models include both actual FL scores (based on Lusardi's "Big Three" questions) and self-perception metrics. The study finds that overconfidence among men, coupled with high risk tolerance, amplifies gender disparities in adoption.

Cascavilla (2024) conducts a targeted study on Italian investors using SHIW-linked survey data, specifically analyzing how financial literacy shapes perceptions of Bitcoin. Using ordered logit models, he finds that individuals with higher financial literacy are more likely to perceive Bitcoin as a speculative asset rather than a store of value. The study also reveals that young investors and individuals with frequent online trading experience are more likely to attribute financial value to Bitcoin, suggesting a strong DFL component. The author emphasizes that misconceptions about risk and return are common, even among financially literate individuals, which reinforces the need for targeted education around digital financial assets.

Jones, Luu, and Samuel (2024) develop and validate a dedicated Cryptocurrency Literacy Scale (CLS) to assess crypto-specific knowledge. Using item response theory (IRT), they construct a 12-item scale covering blockchain, wallets, tokenomics, and fraud detection. Their validation study confirms that higher CLS scores are associated with more cautious behavior in crypto markets and reduced likelihood of falling victim to scams. The study finds that CLS correlates moderately with general financial literacy ($r = 0.53$) and digital behavior, but captures distinct competencies.

Balutel and Engert (2023), using Canadian data, show that digital literacy is more predictive of crypto ownership than traditional financial literacy. Through probit models, they show that individuals who frequently use digital financial services are up to 2.3 times more likely to own crypto-assets. However, they also note that a substantial share of owners lack a full understanding of the products they invest in. The authors call for a clearer separation between digital familiarity and actual risk comprehension in policy-oriented FL frameworks.

Akana and Li (2021), analyzing U.S. Federal Reserve data, find that among crypto users, the vast majority (over 90%) hold assets for investment rather than transactional purposes. Their survey reveals significant heterogeneity by income and race, but consistently shows that those with higher digital confidence but not necessarily higher financial literacy are more likely to adopt crypto. Their study raises concerns about DFL gaps and the potential for unequal access to reliable information.

Italian data from IACOFI 2023 adds a key empirical dimension to this topic. The survey shows that individuals in the top quartile of the digital financial literacy score are approximately 2.1 times more likely to own crypto-assets compared to those in the lowest quartile. However, the association between traditional financial literacy and crypto ownership is weaker and becomes statistically insignificant once digital behavior is controlled for. This suggests that crypto participation is less a function of foundational financial knowledge and more of digital fluency, platform exposure, and online self-learning behaviors.

Additional insights are offered by the OECD and GFLEC (2022) reports, which underscore the regulatory and educational implications of low literacy in high-risk digital financial environments. These reports point to widespread misunderstandings of how crypto-assets work and recommend incorporating crypto-specific content into national financial education strategies.

In sum, crypto-assets challenge traditional frameworks of financial literacy. While financial knowledge remains relevant, especially for risk perception, digital competencies ranging from app navigation to online security are often more decisive in determining whether individuals engage with crypto markets. As digital financial ecosystems expand, bridging both FL and DFL gaps will be essential to ensuring informed and equitable participation.

2.3.5 Gender Disparities in Financial and Digital Financial Literacy

A consistent and well-documented pattern across all areas of financial behavior is the existence of substantial gender disparities in financial literacy (FL), digital financial literacy (DFL), and financial product ownership. These disparities appear early in life, persist across adulthood, and extend into retirement, affecting outcomes such as insurance coverage, pension accumulation, stockholding, and cryptocurrency participation. The literature identifies both structural and behavioral drivers of these gaps, ranging from differences in education and labor market experience to confidence levels, risk tolerance, and societal norms.

Bucher-Koenen et al. (2017) provide one of the most detailed empirical analyses of gender gaps in financial literacy using survey data from multiple countries, including Italy. Their study shows that women consistently underperform men on both basic and advanced financial literacy questions, even after controlling for income, education, and employment status. In their sample, only 27% of women answered all “Big Three” questions correctly, compared to 43% of men. The authors argue that gender differences in confidence rather than ability alone play a central role: women are more likely to answer “do not know” even when their guesses would have been correct.

These findings are reinforced by results from the OECD/INFE Policy Brief (2022), which highlights that across all OECD countries, women tend to score lower than men on financial literacy assessments and are also less confident in their own financial decision-making. The report emphasizes that this confidence gap, rather than a competence gap, may explain why women are less likely to engage in long-term planning or invest in complex financial products.

Luciano, Outreville, and Rossi (2014) observe similar patterns in the Italian context using SHIW 2012. Their logit and Heckman selection models show that women are significantly less likely to hold life insurance or pension products, even after adjusting for income, education, and labor force participation. The probability of life insurance ownership is 9 percentage points lower for women, a gap only partially explained by observable characteristics. They suggest that differences in perceived financial control and familiarity with financial markets likely contribute to this disparity.

IACOFI 2023 provides updated Italian evidence, showing that both FL and DFL scores are consistently lower among women across all age groups. Women score 0.3 standard deviations lower in FL and nearly 0.5 standard deviations lower in DFL on average. This digital gap is especially pronounced among older cohorts and women outside of full-time employment. When estimating multivariate probit models for financial product ownership, the effect of gender remains significant even after controlling for income, education, and region. In particular, the gender gap in DFL strongly predicts underrepresentation of women in digital-only investment products and cryptocurrency platforms.

Bannier, Schwarz, and Heimer (2019) show that in the context of Bitcoin ownership, over 40% of the gender gap can be explained by differences in both actual and perceived financial literacy. Their study highlights that women are more risk-averse, less confident in financial decision-making, and more likely to rely on traditional financial products. Men, in contrast, display higher levels of overconfidence and are more likely to invest in volatile and speculative assets like crypto, even when they have only moderate levels of financial knowledge.

Balutel and Engert (2023) also find that digital confidence is a stronger predictor of crypto ownership than traditional FL scores, and that women lag in both. The authors advocate for targeted digital financial education programs to close these dual gaps. Similarly, data from the GFLEC (2022) gender gap report confirms that across high-income countries, women are underrepresented in crypto ownership by margins of 2:1 or greater, largely due to lower digital engagement and security concerns.

These gender disparities have practical implications. In insurance, women are less likely to own voluntary life coverage, despite often facing longer retirement periods and greater longevity risks. In pension systems, women tend to contribute less and accumulate smaller balances, due to both lower earnings and reduced participation. In capital markets, women invest less frequently and in more conservative instruments, reducing long-run returns. In cryptocurrency, they are significantly underrepresented in both retail and speculative ownership.

Importantly, the evidence suggests that addressing these gaps requires more than simply improving financial knowledge. Interventions must also tackle digital access, self-confidence, cultural norms, and tailored communication strategies. Programs that combine financial education with digital inclusion and that explicitly acknowledge gendered experiences are likely to be more effective in reducing these persistent disparities.

Chapter 3

Data and Methodology

3.1 The data

This thesis makes use of the most recent wave of the *Survey on Financial Literacy and Digital Financial Skills of Adults in Italy* (*Indagine sull'Alfabetizzazione Finanziaria e le Competenze di Finanza Digitale in Italia*), conducted by the Bank of Italy in collaboration with the OECD/INFE (International Network on Financial Education). The 2023 edition was carried out between February and March using Computer-Assisted Telephone Interviewing (CATI), based on a nationally representative sample of just under 5,000 individuals aged between 18 and 79.

Since its launch in 2017, the survey has followed the international standards established by the OECD/INFE, enabling both temporal and cross-country comparability. The core objective is to measure financial literacy through three dimensions: *financial knowledge*, *financial behavior*, and *financial attitudes*. In the 2023 edition, for the first time, the questionnaire was expanded to include items that assess digital financial competencies—a response to the growing relevance of digital tools in managing personal finance. These new items capture knowledge, behavior, and attitudes in the digital financial domain, and were developed in alignment with the latest OECD/INFE guidelines.

The data are made available in anonymized microdata format for research purposes only, in several file types including CSV, Stata, and SAS. The dataset includes detailed responses to a wide range of financial and digital-financial questions, complemented by rich sociodemographic information. All analysis and interpretation of the data presented in this thesis are conducted under the sole responsibility of the author.

The methodology and structure of the survey, including the design of the financial and digital literacy indicators, are extensively documented in the technical report prepared by Lamboglia, Marinucci, Stacchini, and Vassallo (2023), which serves as a key reference throughout this work.[1]

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[1] Lamboglia, S., Marinucci, M., Stacchini, M., & Vassallo, P. (2023). *Indagini sull'alfabetizzazione finanziaria e le competenze di finanza digitale in Italia: adulti.* Banca d'Italia.

3.2 Outcome Variables

In this section, we describe the main financial decision variables analyzed in relation to respondents' levels of financial literacy. These variables capture key dimensions of household financial engagement and are commonly used in the literature to assess how financial knowledge translates into real-world economic behavior.

Portfolio Choices: Among the many financial instruments included in the survey, we focus on five that we classify as traditional investments. These include investment funds, stocks, bonds, cooperative loans and sustainable (ESG) investments. Table 3.1 reports the number of respondents who declared ownership of each of these instruments. These assets are generally associated with higher levels of financial knowledge and long-term financial planning. Stock market participation, in particular, is often used as a proxy for active financial decision-making van Rooij et al. (2011).

Investment	**Ownership Count**	**Investment Share**	**Sample Share**
Investment fund	165	25.82%	3.39%
Stocks	161	25.20%	3.31%
Bonds	269	42.10%	5.53%
Cooperative loans	19	2.97%	0.39%
Sustainable (ESG) investment	25	3.91%	0.51%
Total	**639**	**100.00%**	**13.13%**

Table 3.1: Declared ownership of selected financial instruments, as a share of total investment holdings and of the full sample (N = 4862)

Note: The sample percentages refer to the ratio of declared investment holdings to the total number of individuals in the sample (N = 4862). Since respondents may hold more than one type of financial asset, these figures do not represent the percentage of individuals who own at least one investment, but rather the relative frequency of holdings in the sample.

Among the 639 declared instances of financial investment, bonds represent the largest share at 42.10%, followed by investment funds (25.82%) and stocks (25.20%). Cooperative loans and sustainable (ESG) investments account for 2.97% and 3.91% of reported holdings, respectively. When these figures are scaled to the full sample of respondents (N = 4862), they translate into sample shares of 5.53% for bond ownership, 3.39% for investment funds, and 3.31% for stocks. Overall, these five traditional financial instruments account for 13.13% of investment declarations relative to the total sample.

It is important to note that these percentages reflect the number of investment holdings, not the number of unique investors since individual respondents may own more than one type of financial product. This pattern of relatively limited participation is consistent with prior findings on Italian households' cautious financial behavior. Guiso, Sapienza, and Zingales (2005)[2] attribute low stock market participation in part to a lack of institutional trust, while Gomes, Michaelides, and Polkovnichenko (2009)[3] emphasize risk aversion and high perceived complexity as barriers to entry.

Gender differences also contribute to these outcomes. Bucher-Koenen et al. (2017)[4] document that Italian women are significantly less likely than men to invest in financial markets, partly due to lower financial confidence and greater risk aversion, factors that we further explore in the gender-based sections of our analysis.

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[2] Guiso, L., Sapienza, P., & Zingales, L. (2005). *Trusting the stock market.* The Journal of Finance, 60(6), 2557–2600.

[3] Gomes, F., Michaelides, A., & Polkovnichenko, V. (2009). *Why don't all households hold stocks?* The Journal of Finance, 64(1), 123–166.

[4] Bucher-Koenen, T., Lusardi, A., Alessie, R., & van Rooij, M. (2017). *Gender differences in financial literacy among high school students: Evidence from Italy.* Economic Letters, 153, 10–13.

To give an overview of gender disparities in investment behavior, Table 3.2 reports the number of declared ownerships of traditional financial instruments by gender. It also shows the percentage difference between female and male respondents, calculated relative to male ownership levels.

Investment	**Male**	**Female**	**Female vs. Male (%)**
Investment fund	95	70	−26.32%
Stocks	106	55	−48.11%
Bonds	167	102	−38.92%
Cooperative loans	11	8	−27.27%
Sustainable (ESG) investment	17	8	−52.94%
Total	**396**	**243**	**−38.64%**

Table 3.2: Gender differences in declared ownership of traditional financial investments. The percentage difference is computed as (Female − Male)/Male × 100.

Gender differences in investment behavior are well-documented in the literature and are clearly reflected in our sample. Table 3.2 shows that women declared significantly fewer traditional investment holdings than men across every category. Overall, women account for 243 of the 639 reported investments (38.04%), while men account for 396 (61.96%), representing a gender gap of −38.64%.

This pattern is consistent with prior findings suggesting that women are less likely to participate in financial markets due to a combination of structural and psychological barriers. Studies have repeatedly shown that women tend to exhibit higher levels of risk aversion and lower financial confidence, both of which are strong predictors of reduced investment participation [5].

Van Rooij et al. (2011) find that even after controlling for financial literacy levels, women remain significantly less likely to invest in stocks, suggesting that confidence and familiarity may play an independent role. Similarly, Almenberg and Dreber (2015) highlight that the gender gap in stock market participation is only partially explained by knowledge; perceived competence and comfort with financial decision-making appear equally important.

Our findings reinforce these patterns. The largest gender gap in our data is observed in stock ownership, where female declarations are 48.11% lower than male ones. Other categories also exhibit sizable disparities, including sustainable investments (−52.94%) and bonds (−38.92%). These results suggest that women are underrepresented not only in high-risk portfolio choices like stocks, but also in products typically considered lower risk, such as bonds and funds. This points to a broader disengagement that may stem from a lack of confidence or limited exposure to financial instruments.

Importantly, such disparities are not necessarily driven by differences in actual ability. Research shows that women often underestimate their financial knowledge and are more likely to select "I don't know" responses when asked factual questions about investments and financial concepts . This difference in response behavior may lead to an underestimation of women's latent financial capability and contribute to persistent participation gaps.

In light of these findings, improving financial literacy alone may not be sufficient to close the investment gender gap. Interventions that build financial confidence, promote inclusive financial advising, and normalise investment participation for women are likely necessary to achieve more equitable outcomes in wealth accumulation and financial security.

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[5] See Bucher-Koenen et al. (2017), *Gender differences in financial literacy among high school students: Evidence from Italy*; Van Rooij et al. (2011), *Financial literacy and stock market participation*; and Almenberg and Dreber (2015), *Gender, stock market participation and financial literacy.*

Insurance Ownership: Respondents are asked whether they hold voluntary insurance policies, such as life insurance, home insurance, or private health insurance. Insurance decisions involve understanding risk, premiums, and long-term consequences - domains in which financial literacy plays a key role [6].

Insurance Status	**Count**	**Percentage**
Insurance owned	340	6.99%
No insurance owned	1302	26.78%
Prefer not to answer	20	0.41%
NA	3200	65.82%
Total	**4862**	**100.00%**

Table 3.3: Distribution of declared insurance ownership status

Insurance ownership represents another important dimension of household financial behavior, often associated with risk preferences and long-term financial planning. In the survey, respondents were asked whether they owned any voluntary insurance product, such as life, home, or health insurance. Table 3.3 presents the distribution of responses. While 6.99% of the total sample declared owning some form of insurance, a much larger group either declared not owning any (26.78%) or did not respond to the question (66.23%, including NAs and refusals). The high rate of missing responses suggests potential measurement or disclosure issues and will be considered in the empirical strategy.

This low reported rate of insurance ownership aligns with prior research indicating limited participation in insurance markets among Italian households. Studies have shown that factors such as income, family structure, employment status, and geographical location significantly influence the demand for life insurance in Italy. For instance, Luciano et al. (2016)[7] found that women are less likely to be insured than men, even after controlling for various socio-economic factors. Additionally, financial literacy and proximity to financial markets have been identified as significant determinants of insurance demand. Luciano and Rossi (2014)[8] emphasized the role of financial inclusion, proxied by stock and home ownership, in shaping life insurance demand.

These findings underscore the importance of considering socio-economic and behavioral factors when analyzing insurance ownership patterns. The observed low participation rates, coupled with high non-response, highlight the need for targeted policies aimed at improving financial literacy and promoting insurance uptake among underrepresented groups.

To more precisely assess gender differences in insurance uptake, Table 3.4 presents declared ownership rates of voluntary insurance products, disaggregated by gender.

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[6] IVASS (2023), *Life Insurance Demand in Italy: Empirical Evidence and Policy Implications.*

[7] Luciano, E., Outreville, J. F., & Rossi, M. C. (2016). *Life Insurance Ownership by Italian Households: A Gender-Based Differences Analysis.* The Geneva Papers on Risk and Insurance - Issues and Practice, 41(3), 468–490.

[8] Luciano, E., & Rossi, M. C. (2014). *Life Insurance Demand and Financial Inclusion: Evidence from Italian Households.* Collegio Carlo Alberto Working Paper No. 398.

Insurance Status	**Male**	**Female**	**Female vs. Male (%)**
No insurance	682	620	−9.09%
Owns insurance	194	146	−24.74%

Table 3.4: Declared insurance ownership by gender. Percentage difference calculated as (Female − Male)/Male × 100.

Again, we find a gap between men and women similarly to investment holdings, since an insurance can be seen as a long-term investment this doesn't come as a surprise.

Pension Fund Participation: Participation in complementary pension schemes reflects long-term financial planning and is often used to gauge retirement preparedness. This variable captures whether the respondent has invested in a private or occupational pension plan, supplementing the public pension system. Prior studies have shown that pension planning correlates strongly with both financial literacy and time preference Lusardi and Mitchell (2011b).

Pension Fund Status	**Count**	**Percentage**
Pension fund owned	256	5.27%
No pension fund owned	1509	31.04%
Prefer not to answer	24	0.49%
NA	3073	63.20%
Total	**4862**	**100.00%**

Table 3.5: Distribution of declared pension fund ownership status

Pension fund participation is a key indicator of long-term financial planning and retirement preparedness. In the survey, respondents were asked whether they own any supplementary pension product. Table 3.5 shows the breakdown of responses. Only 5.27% of individuals reported owning a pension fund, while 31.04% explicitly stated they do not. The majority of the sample (63.20%) either did not provide a response or the variable was missing.

The low rate of reported pension fund ownership aligns with existing literature on Italy's pension landscape. Despite several pension reforms and fiscal incentives introduced in the last two decades, participation in voluntary pension schemes remains limited. According to OECD data and national studies, a lack of trust in financial markets, low financial literacy, and reliance on the public pension system are common deterrents to supplementary retirement saving Millo and Camerci (2014)[9]. In particular, Millo and Camerci (2014) emphasize that both education and access to financial advice significantly increase the probability of pension fund participation.

This evidence suggests that broader financial literacy and institutional trust are crucial for enhancing pension preparedness, and these factors will be explored in the regression analyses that follow.

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[9] Millo, F., & Camerci, A. (2014). *Financial Literacy and Participation in Pension Funds: Evidence from Italy.* Rivista di Politica Economica, 104(5–6), 199–226.

To highlight gender patterns in long-term financial planning, Table 3.6 presents pension fund participation by gender, including the relative difference between female and male ownership rates.

Pension Status	**Male**	**Female**	**Female vs. Male (%)**
No pension fund	780	729	−6.54%
Has pension fund	152	104	−31.58%

Table 3.6: Declared pension fund participation by gender. Percentage difference calculated as (Female − Male)/Male × 100.

Among those who reported their status, 152 men declared owning a pension fund compared to 104 women, a gap of −31.58%. This is consistent with existing literature documenting gender disparities in retirement preparedness .[10]

These differences are often attributed to a combination of lower income levels, shorter and more interrupted careers, and lower financial confidence among women, all of which affect pension accumulation and investment decisions. Women are also more likely to work part-time or in informal employment, reducing both the availability of occupational pension schemes and their perceived need for private pension planning .

Moreover, studies show that women are less likely to seek or receive financial advice regarding retirement planning, and tend to underestimate their retirement income needs . This contributes to lower participation in voluntary pension schemes, even when controlling for income and education. In the Italian context, where trust in financial institutions remains a barrier, such psychological and informational asymmetries may disproportionately affect women.

Taken together, these results underscore the importance of addressing both structural and behavioral factors behind the gender gap in pension participation. Policy interventions that promote inclusive access to retirement products, encourage tailored financial education, and offer proactive financial advice to women may help bridge this gap and foster greater financial security in retirement.

Cryptocurrency Ownership: Ownership of crypto-assets is included as a distinct financial behavior, given its rising relevance and demographic concentration. While riskier and more speculative than traditional portfolio choices, cryptocurrencies have gained traction especially among younger, more digitally active groups [11].[12] This variable captures whether the respondent reports owning any form of digital currency such as Bitcoin, Ethereum, or other tokens.

Crypto Investment Status	**Count**	**Percentage**
Does not hold crypto	775	15.94%
Holds crypto	39	0.80%
Missing (NA)	215	4.42%
Prefer not to answer	17	0.35%
NA	3816	78.49%
Total	**4862**	**100.00%**

Table 3.7: Declared ownership of crypto-assets

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[10] See Bucher-Koenen et al. (2017); and OECD (2021), *Towards Improved Retirement Savings Outcomes for Women.*

[11] Stix, H. (2019), *Ownership and purchase intention of crypto-assets – survey results.* Oesterreichische Nationalbank.

[12] Akana, T. & Li, G. (2021), *Cryptocurrency Ownership: Insights from the CFI COVID-19 Survey of Consumers.* Federal Reserve Bank of Philadelphia and Federal Reserve Board.

In recent years, crypto-assets have emerged as a novel and increasingly visible component of household portfolios. In the 2023 survey, respondents were asked whether they own any form of cryptocurrency. Table 3.7 summarizes the responses. Only 0.80% of the sample declared owning crypto-assets, while 15.94% explicitly stated they do not. The remaining 83.26% either did not respond, answered "prefer not to say", or were marked as missing a nonresponse rate higher than for any other financial asset type in the dataset.

This extremely low declared ownership rate is consistent with findings from recent surveys in Italy and elsewhere, which report crypto ownership to be limited but growing, especially among younger populations and students. Stix (2019)[13] shows that ownership is concentrated in the under-40 population and associated with greater risk tolerance and digital financial engagement. Similarly, Akana and Li (2021)[14] find that millennials and students are significantly more likely to hold or consider holding crypto-assets than older cohorts.

In our analysis, we account for this by examining crypto ownership with a focus on age and student status. The high nonresponse rate may reflect unfamiliarity with the asset class or reluctance to disclose ownership, which should be considered when interpreting the results.

Given the distinct demographic patterns associated with crypto-assets, Table 3.8 reports declared ownership by gender, along with the relative gender gap in participation.

Crypto Status	**Male**	**Female**	**Female vs. Male (%)**
Does not own crypto	533	457	−14.26%
Owns crypto	27	12	−55.56%

Table 3.8: Declared crypto-asset ownership by gender. Percentage difference calculated as (Female − Male)/Male × 100.

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[13] Stix, H. (2019). *Ownership and purchase intention of crypto-assets – survey results.* Oesterreichische Nationalbank.

[14] Akana, T. & Li, G. (2021). *Cryptocurrency Ownership: Insights from the CFI COVID-19 Survey of Consumers.* Federal Reserve Bank of Philadelphia and Federal Reserve Board.

3.3 Main Explanatory Variables

In line with the growing literature on financial decision-making and financial literacy, our analysis focuses on a set of sociodemographic characteristics that have been shown to be closely associated with individual financial knowledge and behavior (see, e.g., van Rooij et al. (2011); Jappelli and Padula (2015a)).[15]

Gender: Gender is a binary variable coded as 0 for men and 1 for women, with the option for respondents to answer "Other" or "Prefer not to say", however nobody refrained from answering the question. Gender plays a central role in our investigation of financial literacy, especially considering the strong evidence of a perpetual knowledge gap between men and women that has been highlighted in past research.We also found, as this evidence suggests, that women tend to underperform men in financial knowledge assessments, even when controlling for other factors (Bucher-Koenen et al. (2017a)).[16]

Gender	Count	Percentage
Female	2446	50.31%
Male	2416	49.69%
Total	**4862**	**100.00%**

Table 3.9: Distribution of respondents by gender

Age: Age is recorded as a continuous numerical variable, ranging from 18 to 79 years old. The literature often identifies a hump-shaped relationship between age and financial literacy, with performance peaking in middle age and declining later in life due to cognitive aging (van Rooij et al. (2011)).[17] Almost all of the respondents answered the age question except for 219 individuals who preferred not to disclose their age but chose, however, to disclose the age range in which they fall in, therefore, in terms of age ranges we have the complete data.

Statistic	Value
Minimum	18
25th percentile (Q1)	36
Median (Q2)	50
75th percentile (Q3)	65
Maximum	79
Mean	50.31
Standard Deviation (SD)	16.68

Table 3.10: Summary statistics for age (continuous)

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[15] van Rooij, Lusardi, and Alessie (2011), *Financial literacy and stock market participation.* Jappelli and Padula (2015), *Investment in financial literacy, social security, and portfolio choice.*

[16] Bucher-Koenen et al. (2017), *Gender differences in financial literacy among high school students: Evidence from Italy.*

[17] van Rooij, Lusardi, and Alessie (2011), *Financial literacy and stock market participation.*

Age Range	**Count**	**Percentage**
18–19	131	2.69%
20–29	436	8.97%
30–39	880	18.10%
40–49	880	18.10%
50–59	958	19.70%
60–69	841	17.30%
70–79	736	15.14%
Total	**4862**	**100.00%**

Table 3.11: Distribution of respondents by age range

Income: Income is a categorical variable indicating the respondent's individual monthly net income bracket. While income is often treated as an outcome of financial literacy, some studies emphasize a bidirectional relationship: financial literacy may also be a determinant of income by enabling better financial planning, investment, and risk management Jappelli and Padula (2013); Lusardi and Mitchell (2011b).[18] Approximately one third of the sample (31.74%) falls into the medium income bracket, as expected. A comparable share (29.31%) reports a relatively low income, while only a small proportion (7.84%) earns more than >2900 € per month. Notably, about a quarter of respondents (25.28%) chose not to disclose their income, which is consistent with the idea that income is a sensitive topic many individuals may be hesitant to share.

Income Category	**Count**	**Percentage**
Low income (<1750 €)	1425	29.31%
Medium income (1751–2900 €)	1543	31.74%
High income (>2900 €)	381	7.84%
I don't know	284	5.84%
Prefer not to answer	1229	25.28%
Total	**4862**	**100.00%**

Table 3.12: Distribution of respondents by monthly net household income

Education: The original education variable in the dataset contains many granular categories, ranging from primary school to post-graduate education. For greater interpretability and consistency with prior research (e.g., Lusardi and Mitchell (2011b)), we grouped these categories into three broader levels:

1. *Low education:* Up to lower secondary education;
2. *Medium education:* Upper secondary or post-secondary non-tertiary;
3. *High education:* Tertiary education (Bachelor's degree or higher).

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[18] Jappelli and Padula (2013), *Investment in financial literacy and saving decisions.* Lusardi and Mitchell (2011), *Financial literacy and retirement planning in the United States.*

Original Education Level	**Grouped Category**
Postgraduate specialization	*University degree and above*
Master's degree or single-cycle degree	
Bachelor's degree	
University but no degree	*High school degree*
High school diploma	
High school without diploma	*Middle school degree and below*
Middle school with diploma	
Middle school without diploma	
Primary school with diploma	
Primary school or no education	

Table 3.13: Mapping of original education levels into grouped categories (English)

This simplification helps improve clarity and statistical power when comparing across subgroups.[19] In terms of education, the majority of respondents in the sample hold a high school diploma (58.4%), while around one-fifth (20.0%) possess a university degree or higher, and approximately the same share (21.6%) have an education level no higher than middle school. These figures are broadly consistent with Italy's national educational attainment profile. According to Eurostat, only 20% of Italian adults aged 25–64 held a tertiary degree in 2022 one of the lowest shares among EU member states Eurostat (2022)[20]. However, recent data from Istat indicate a positive trend: among young adults aged 25–34, the share of university graduates increased from 29.2% in 2022 to 30.6% in 2023 Istat (2023)[21].

Education Level	**Count**	**Percentage**
Middle school degree and below	1048	21.55%
High school degree	2841	58.43%
University degree and above	973	20.01%
Total	**4862**	**100.00%**

Table 3.14: Distribution of respondents by education level (grouped)

Geographical Area: Geographical area is a categorical variable identifying macro-regions: North-West, North-East, Center, South, and Islands. The inclusion of this variable accounts for Italy's well-known territorial disparities, which influence both financial opportunities and literacy outcomes.[22]

Area	**Count**	**Percentage**
North-West	1317	27.09%
North-East	952	19.58%
Center	915	18.82%
South	1139	23.43%
Islands	539	11.09%
Total	**4862**	**100.00%**

Table 3.15: Distribution of respondents by geographical area

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[19] Lusardi and Mitchell (2011), *Financial literacy and retirement planning in the United States.*

[20] Eurostat (2022), *Educational attainment statistics.*

[21] Istat (2023), *2. Education and Training.*

[22] IVASS (2023), *Life Insurance Demand in Italy: Empirical Evidence and Policy Implications.*

Occupation: Occupation is originally a multi-category variable, which we recoded into broader, interpretable groups:

1. *Employed or Trainee*
2. *Self-employed*
3. *Housewife/Househusband*
4. *Unemployed or Inactive*
5. *Retired*

Original Occupation Category	**Grouped Category**
Employee Trainee / Apprentice	*Employee or Trainee*
Self-employed	*Self-employed*
Housewife / Househusband	*Housewife/Househusband*
Unemployed (looking for work) Not suitable for work (health reasons) Not working and not seeking work Student Other	*Unemployed or Inactive*
Retired	*Retired*

Table 3.16: Mapping of original occupation categories into grouped categories (English)

This variable allows us to assess how labor market status relates to financial literacy and financial engagement. Previous research suggests that financial literacy is positively associated with employment particularly among full-time and self-employed individuals and tends to be lower among homemakers and the unemployed [23]. For most of our analysis, we focus on the distinction between employed, non-employed, and those formerly employed (i.e., retirees).

However, for specific investigations particularly those involving cryptocurrency adoption we further disaggregate the occupational categories to identify students as a separate group. This decision is motivated by survey evidence from Stix (2019) Stix (2019)[24], who finds that crypto-assets are more commonly held and considered by students and younger individuals. Similarly, Akana and Li (2021) Akana and Li (2021)[25] show that millennials in particular exhibit significantly higher rates of cryptocurrency ownership compared to other age groups.

Each of the variables described above plays a central role in our empirical investigation of the relationship between financial literacy and household financial decisions. The descriptive statistics presented illustrate the heterogeneity of the sample in terms of demographic and socioeconomic characteristics dimensions that are widely acknowledged to influence financial behavior. Understanding this underlying variation is essential to interpreting the associations we observe later in the analysis. In the next section, we turn our attention to the core financial decision variables that form the basis of our empirical models, including indicators of traditional investment behavior, insurance ownership, pension participation, and cryptocurrency holdings.

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[23] IVASS (2023), *Life Insurance Demand in Italy: Empirical Evidence and Policy Implications.*

[24] Stix, H. (2019), *Ownership and purchase intention of crypto-assets – survey results.* Oesterreichische Nationalbank.

[25] Akana, T. & Li, G. (2021), *Cryptocurrency Ownership: Insights from the CFI COVID-19 Survey of Consumers.* Federal Reserve Bank of Philadelphia and Federal Reserve Board.

Chapter 4

Financial Literacy

4.1 Descriptive Statistics

This section presents summary statistics for the three components of financial literacy, knowledge, behavior, and attitude, as well as for the total composite score. These statistics help to illustrate the distribution and internal consistency of the financial literacy index used in the analysis. Table 4.1 reports the mean, median, standard deviation, and distribution quartiles for each dimension. Table 4.2 further breaks down the total financial literacy scores into four ordinal categories based on the score ranges.

Component	**Min**	**Q1**	**Median**	**Mean**	**Q3**	**Max**	**SD**	**Max Score**
Financial Knowledge	0	3	4	3.85	5	7	1.93	7
Financial Attitude	0	2	2	2.32	3	4	0.74	4
Financial behavior	0	4	5	4.70	6	8	1.72	9
Financial Literacy	2	9	11	10.87	13	19	3.09	20

Table 4.1: Summary statistics for the components of financial literacy

Score Range	**Count (n)**	**Percentage**
0–5	323	6.64%
6–10	1631	33.55%
11–15	2677	55.06%
16–20	231	4.75%
Total	**4862**	**100.00%**

Table 4.2: Distribution of total financial literacy scores in the sample

The results highlight a concentration of scores in the intermediate range. More than half of the respondents (55.06%) fall within the 11–15 point bracket, suggesting that while a substantial share of the population possesses a moderate degree of financial literacy, relatively few reach the upper end of the scale. Only 4.75% of the sample achieved a score between 16 and 20, which could be considered a high level of financial literacy. At the lower end, approximately 40% of the population scored 10 or below, indicating limited understanding or application of key financial concepts and behaviors. These figures underscore the substantial variation in financial literacy within the Italian adult population, justifying further investigation into its determinants and effects.

4.2 Differences within Key Variables

4.2.1 A Focus on Gender Differences

In line with findings from international research, gender differences in financial literacy are also evident in the Italian sample. Table 4.3 presents the mean scores and standard deviations for each component of the financial literacy index, disaggregated by gender. The table also reports the male-female gap for each dimension, offering a concise view of the extent and direction of these disparities.

Component	**Female (Mean)**	**Male (Mean)**	**SD (Female)**	**SD (Male)**
Financial Knowledge	3.63	4.07	1.95	1.89
Financial Attitude	2.36	2.29	0.76	0.72
Financial behavior	4.61	4.79	1.76	1.68
Financial Literacy (Total)	10.59	11.14	3.16	2.99

Table 4.3: Gender differences in financial literacy and its components

The results in Table 4.3 confirm the presence of a gender gap in financial literacy, with men scoring higher than women across most components of the index. The largest gap appears in financial knowledge (0.44 points), consistent with prior studies. However, this gap should not be interpreted as reflecting purely differences in ability. Numerous studies have shown that women are more likely to select the "I don't know" response in financial literacy surveys, particularly for risk-related questions [1].

In contrast, men tend to guess more confidently, increasing their chances of correct responses even when uncertain. Interestingly, women score slightly higher than men on the financial attitude component, which reflects preferences for saving, planning, and future-oriented behavior. This suggests that women may exhibit more prudent financial habits despite reporting lower confidence in their knowledge. These findings support calls for more nuanced measurement approaches that distinguish between knowledge and confidence when assessing financial literacy.

To investigate whether the gender gap in financial knowledge may be partially explained by differing response behavior particularly the tendency to answer "I don't know" we analyse the frequency of this response by gender across three key knowledge questions in our sample. Table **??** presents the results.

Gender	**Total "Don't Know"**	**Total Responses**	**% "Don't Know"**
Female	4,184	17,122	24.44%
Male	2,790	16,912	16.50%

Table 4.4: Overall "I don't know" response rate in financial knowledge questions by gender

Note: Each respondent was asked 7 financial knowledge questions. The total number of responses per gender is calculated as: `number_of_individuals` × 7. For example, total responses for females: `2446 * 7 = 17122`.

Table 4.4 shows the combined percentage of "I don't know" responses given by male and female respondents across all financial knowledge questions. The data reveal a clear gap: nearly one in four answers given by women were "I don't know" (24.44%), compared to only 16.50% among men. These results are consistent with existing literature suggesting that women tend to be less confident in their financial knowledge and more likely to opt for non-response even when they might know the correct answer [2].

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[1] Bucher-Koenen et al. (2017), *How financially literate are women?*; Lusardi and Mitchell (2011), *Financial literacy and retirement planning in the U.S.*; and Balutel and Engert (2023), *Crypto and financial literacy: Evidence from Canada.*

This difference in response style has important implications: it may partly explain why women's financial knowledge scores appear lower on average, even though the actual level of understanding may not be as different as raw scores suggest. It supports the argument that financial literacy metrics should not be interpreted as pure measures of cognitive ability, but rather as reflections of knowledge, confidence, and response behavior combined.

4.2.2 Age Differences

Age is a well-documented factor influencing financial literacy, with numerous studies suggesting that financial knowledge tends to increase with age due to life experience, but may decline in older age due to cognitive aging . Financial behavior and attitudes are also shaped by age-related differences in financial responsibility, exposure to financial products, and planning horizons. For example, older adults may be more cautious or future-oriented in their financial attitudes, while younger adults may be more digitally fluent but less experienced in long-term financial planning.

To explore this dynamic, we examine financial literacy performance across six age groups, covering all three OECD/INFE financial literacy components knowledge, attitude, and behavior as well as the total score. Table 4.5 summarises the mean score and sample size for each component by age band.

Age Group	n	Knowledge	Attitude	behavior	Total FinLit
18–29	567	3.17	2.10	3.88	9.15
30–39	880	4.05	2.34	4.99	11.37
40–49	880	4.05	2.38	4.98	11.42
50–59	958	4.13	2.32	4.78	11.22
60–69	841	3.99	2.38	4.69	11.05
70–79	736	3.36	2.36	4.55	10.27

Table 4.5: Mean financial literacy scores by age group (n = sample size)

Table 4.5 illustrates clear age-related patterns in financial literacy performance. Overall, financial literacy improves markedly between early adulthood and middle age, with total scores peaking in the 40–49 age group (11.42 out of 20). This trajectory aligns with the notion that financial capability grows as individuals accumulate experience managing income, debt, and savings .

Financial knowledge shows the most pronounced age effect: young adults aged 18–29 have a mean score of only 3.17, compared to 4.13 among those aged 50–59. However, this knowledge gain reverses after age 60, with a significant drop to 3.36 in the 70–79 group. This pattern may reflect both generational gaps in formal financial education and cognitive decline affecting older respondents .

Attitude scores are relatively stable across age groups, fluctuating modestly between 2.10 and 2.38. Older adults tend to score slightly higher on financial attitude measures, perhaps due to increased concern with saving and planning for retirement.

Financial behavior improves from early adulthood (3.88) to midlife (4.99), and then gradually declines in later age (4.55). This may reflect reduced engagement with complex financial products after retirement, or fewer financial obligations such as mortgages or children's education.

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[2] Bucher-Koenen et al. (2017); Balutel and Engert (2023).

In summary, the results confirm that age plays a significant role in shaping financial literacy. While experience enhances knowledge and behavior in midlife, declines in older age suggest a need for continued support and tailored financial education for older adults particularly in areas such as fraud prevention and digital banking .

4.2.3 Income Differences

Income is a well-established and persistent determinant of financial literacy. Numerous studies have shown that individuals with higher income levels tend to score better on financial knowledge, exhibit more prudent financial behaviors, and are better equipped to plan for the future Lusardi and Mitchell (2011b); Jappelli and Padula (2013).[3] This is often attributed to greater financial exposure, higher levels of education and numeracy, and increased incentive to engage in long-term financial planning.

To investigate the role of income in shaping financial capability, we disaggregate financial literacy scores across four income categories: <€1,750, €1,751–2,900, >€2,900, and those who preferred not to disclose their income. Table 4.6 presents average scores for each financial literacy component knowledge, attitude, and behavior as well as the overall index.

Income Group	**n**	**Knowledge**	**Attitude**	**behavior**	**Total FinLit**
<€1,750	1425	3.94	2.29	4.73	10.96
€1,751–2,900	1543	4.30	2.26	4.88	11.44
>€2,900	381	4.53	2.40	5.08	12.01
Prefer not to say	1513	3.13	2.40	4.38	9.91

Table 4.6: Mean financial literacy scores by income group (n = sample size)

Table 4.6 shows clear income-related disparities in financial literacy. Individuals in the highest income bracket (>€2,900) score highest across all components, with a total mean score of 12.01 out of 20. This group demonstrates stronger performance in both financial knowledge (4.53) and financial behavior (5.08), supporting the argument that financial means often coincide with more frequent use of financial products and greater familiarity with complex decision-making processes.

Respondents in the middle-income category (€1,751–2,900) also perform reasonably well, with a total score of 11.44. In contrast, those in the lowest income group (<€1,750) score 10.96 on average, while those who did not disclose their income show the lowest overall performance, with a total score of 9.91.

Financial knowledge displays the strongest income gradient: respondents earning >€2,900 score 4.53, compared to just 3.13 among those who preferred not to respond. This likely reflects both cognitive and informational differences, as well as reduced financial exposure among lower- or non-reporting income groups. **behavior** scores follow a similar pattern, with a 0.7-point gap between high-income and non-disclosure groups (5.08 vs. 4.38).

Interestingly, **attitudes** toward saving and planning are relatively stable across groups, with only a slight increase observed among those in the highest bracket and non-disclosers. This suggests that forward-looking preferences may not be as income-dependent as knowledge or behavior, or that they are shaped more by cultural and psychological traits than by financial means.

These results reinforce the finding that income and financial literacy are closely intertwined, both directly and indirectly. Financial literacy contributes to better financial outcomes, but the ability to acquire and apply financial knowledge may itself depend on income-related factors such as access, education, and life experience.

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[3] Lusardi and Mitchell (2011), *Financial literacy and retirement planning in the United States*; and Jappelli and Padula (2013), *Investment in financial literacy and saving decisions.*

4.2.4 Geographical Differences

Geographical disparities in financial literacy are particularly relevant in the Italian context, where persistent north–south divides in education, income, and financial infrastructure have long been documented [4]. Northern regions tend to have higher levels of economic development, greater access to financial services, and stronger educational outcomes, all factors linked to financial literacy.

To explore these regional patterns, we divide the sample into five macro-areas: North-West, North-East, Center, South, and Islands. Table 4.7 presents the mean financial literacy scores by area for each component of the index, knowledge, attitude, and behavior, as well as the composite score.

Region	**n**	**Knowledge**	**Attitude**	**behavior**	**Total FinLit**
North-West	1317	4.04	2.31	4.84	11.19
North-East	952	3.95	2.32	4.78	11.05
Center	915	3.83	2.36	4.65	10.84
South	1139	3.61	2.31	4.50	10.42
Islands	539	3.71	2.35	4.69	10.75

Table 4.7: Mean financial literacy scores by geographical area (n = sample size)

Table 4.7 confirms the existence of geographical disparities in financial literacy within Italy. Respondents from the North-West report the highest overall financial literacy score (11.19), followed closely by the North-East (11.05). These regions outperform the national average across all three components, knowledge, attitude, and behavior.

In contrast, the South and Islands trail behind, with total scores of 10.42 and 10.75, respectively. The gap between the North-West and South is particularly pronounced in financial knowledge (4.04 vs. 3.61), suggesting regional differences in exposure to financial concepts or formal education outcomes. behavior scores also vary substantially, from 4.84 in the North-West to just 4.50 in the South.

Interestingly, **attitude scores** show less variation, ranging from 2.31 to 2.36 across all regions. This suggests that long-term preferences, such as future orientation and saving habits, may be less sensitive to regional context compared to knowledge and behavior.

These findings align with previous research showing that northern regions tend to benefit from higher levels of economic activity, better infrastructure, and broader access to financial advice and services. Conversely, lower literacy in the South and Islands may reflect more limited financial ecosystems, lower income levels, and enduring educational inequalities.

Addressing these geographical gaps will require regionally tailored interventions, particularly in the South and Islands, where structural barriers to financial inclusion and capability remain most persistent.

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[4] Guiso et al. (2003), *People's opium? Religion and economic attitudes*; and Banca d'Italia (2023), *Risultati dell'indagine sull'alfabetizzazione finanziaria degli adulti: edizione 2023.*

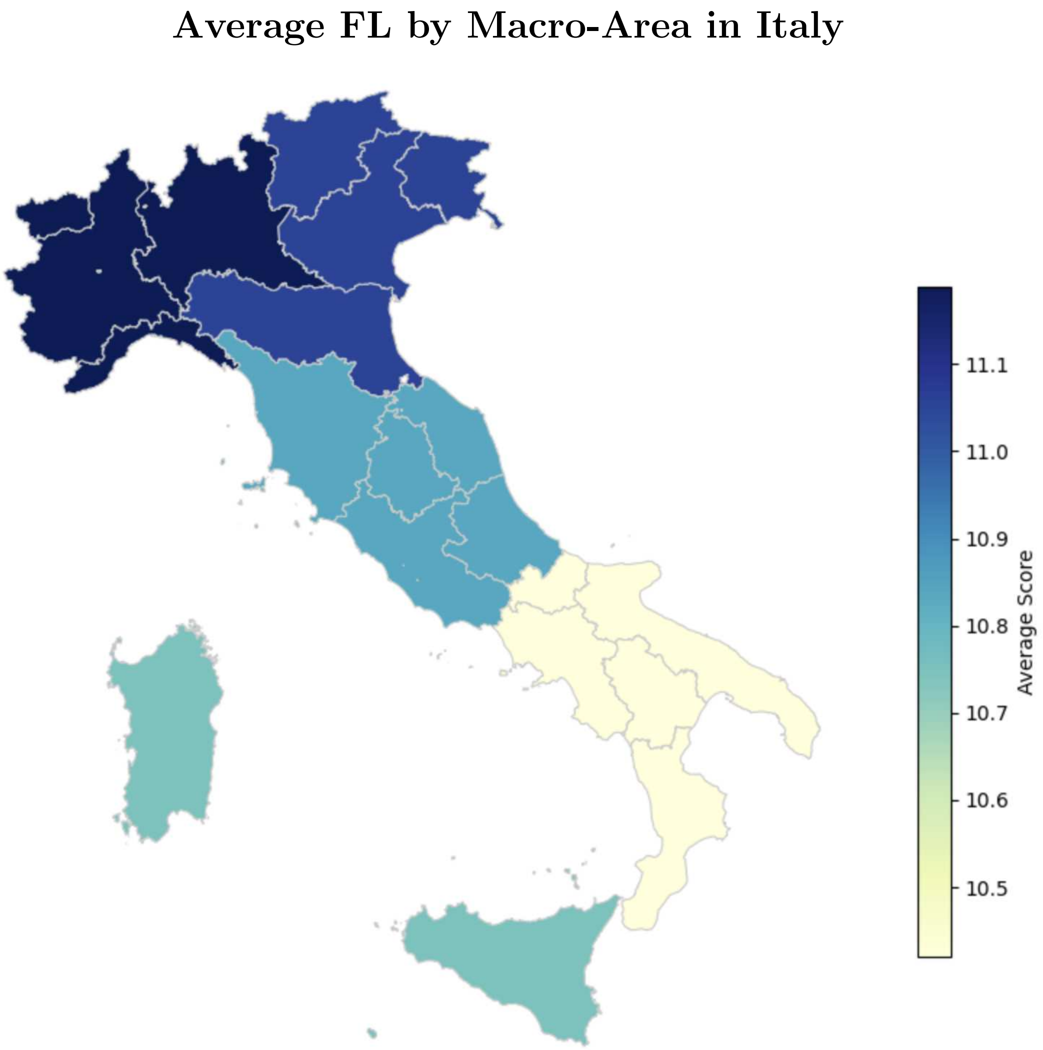

Figure 4.1: Regional differences in average financial literacy scores across Italy, based on the 2023 IACOFI dataset. The map reflects the OECD/INFE methodology and aggregates knowledge, behavior, and attitude components into a total score out of 20. Macro-regions are used for comparability.

Figure 4.1 provides a spatial representation of the regional differences reported in Table 4.7. By visually aggregating Italian regions into five macro-areas, the map highlights the pronounced north–south divide in financial literacy across the country.

This geographical layout offers an intuitive and immediate understanding of the patterns discussed above, with darker shades corresponding to higher average scores. The use of macro-areas ensures consistency with national survey frameworks while making regional disparities more accessible to visual interpretation.

4.2.5 Education Differences

Education is one of the most robust predictors of financial literacy across countries and demographic contexts. Individuals with higher educational attainment generally score better on financial knowledge, behavior, and planning indicators, due to greater exposure to numeracy, problem-solving, and economic concepts throughout their academic and professional lives .[5] Financial literacy, in turn, has been shown to mediate the relationship between education and economic outcomes such as wealth accumulation, investment, and pension planning.

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[5] Lusardi and Mitchell (2011); and Jappelli and Padula (2013).

In this section, we explore differences in financial literacy scores across three education levels: (i) middle school degree or below, (ii) high school degree, and (iii) university degree and above. Table 4.8 reports the mean scores, standard deviations, and sample sizes for each group across the three OECD/INFE literacy components knowledge, attitude, and behavior as well as the composite index.

Education Level	**n**	**Knowledge**	**Attitude**	**behavior**	**Total FinLit**
Middle school degree or below	1048	2.96	2.33	4.25	9.54
High school degree	2841	4.01	2.33	4.69	11.03
University degree and above	973	4.34	2.29	5.20	11.83

Table 4.8: Mean financial literacy scores by education level (n = sample size)

Table 4.8 shows a clear educational gradient in financial literacy. The total score rises from 9.54 among respondents with a middle school education or less, to 11.03 among high school graduates, and reaches 11.83 for those with a university degree. This nearly 2.3-point difference between the highest and lowest education groups is substantial given the 20-point scale, and supports the well-established link between formal education and financial capability .[6]

Financial knowledge shows the sharpest divide: university-educated individuals score an average of 4.34, compared to just 2.96 for those with lower education. This suggests that the ability to understand key financial concepts such as interest compounding, inflation, and diversification is closely tied to educational attainment.

behavior scores also increase with education. Individuals with a university degree report more prudent financial behaviors (5.20), such as timely bill payment, budgeting, and regular saving, compared to 4.25 among those with only a middle school background.

Interestingly, **attitudes** are relatively stable across groups, with only minor variation. All three groups cluster around a mean of 2.30–2.33, suggesting that long-term financial attitudes such as future orientation or thrift may be less sensitive to formal education and more influenced by cultural or personality traits.

These results highlight the importance of integrating financial education into formal schooling curricula, especially for students from lower socioeconomic backgrounds who may have limited financial exposure at home. Targeted programs that introduce key financial principles earlier in life may help reduce long-term disparities in financial decision-making and preparedness.

4.2.6 Occupation Differences

Occupation reflects not only income but also an individual's exposure to financial decision-making, risk management, and long-term planning, factors which significantly shape financial literacy. Individuals who are employed or self-employed typically engage more actively with budgeting, saving, and investment decisions. In contrast, those who are unemployed, inactive, or primarily engaged in unpaid domestic roles may face fewer opportunities to develop or apply financial skills .[7]

To better reflect the heterogeneity in employment types, we regrouped the occupational categories into five major groups: *Employee or Trainee*, *Self-employed*, *Retired*, *Housewife/Househusband*, and *Unemployed or Inactive*. Table 4.9 presents the mean scores and standard deviations for each financial literacy component and the total score across these revised groups.

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[6] Lusardi and Mitchell (2011), *Financial literacy and retirement planning in the United States.*

[7] Lusardi and Mitchell (2011); and Millo and Camerci (2014), *Financial Literacy and Participation in Pension Funds: Evidence from Italy.*

Occupation Group	**n**	**Knowledge**	**Attitude**	**behavior**	**Total FinLit**
Employee or Trainee	2494	4.14	2.35	4.95	11.44
Self-employed	401	4.18	2.25	5.20	11.64
Retired	1172	3.68	2.38	4.69	10.76
Housewife/Househusband	349	3.02	2.35	3.98	9.35
Unemployed or Inactive	446	2.98	2.07	3.39	8.44

Table 4.9: Mean financial literacy scores by revised occupational status (n = sample size)

Table 4.9 confirms the strong relationship between occupational status and financial literacy. The highest average scores are observed among the self-employed (11.64) and employees or trainees (11.44), both of whom are actively involved in financial decision-making on a regular basis. Their high scores across all three components knowledge, attitude, and behavior reflect both necessity and opportunity for financial competence.

In contrast, individuals who are unemployed or inactive show the lowest overall scores (8.44), with particularly low values in financial knowledge (2.98) and behavior (3.39). This group likely faces multiple barriers, including lower income, irregular financial obligations, and possibly diminished motivation or confidence in engaging with financial systems.

Retirees score moderately high (10.76), suggesting retained knowledge and behavior built over a lifetime of financial activity. Interestingly, their attitude scores (2.38) are the highest of all groups, potentially reflecting a stronger orientation toward saving and planning later in life.

Housewives and househusbands report significantly lower scores across the board (9.35 total), particularly in behavior (3.98), pointing to a potential gap in financial exposure and independent management of finances, even if household-level financial activities are present.

Overall, the findings underscore how labour force engagement supports the development and application of financial literacy. Groups outside the labour market especially those neither retired nor employed show consistently lower scores, emphasizing the need for targeted financial education to ensure no one is excluded from developing these essential skills.

4.2.7 Portfolio Composition Differences

Investment behavior is closely tied to financial literacy. Individuals with higher financial knowledge and stronger behavioral scores are more likely to participate in complex or long-term investment products. In turn, engaging with financial markets may also reinforce literacy by fostering regular exposure to concepts such as risk, return, diversification, and planning [8].

To explore how financial literacy varies by investment type, Table 4.10 reports mean scores across the three literacy dimensions, knowledge, attitude, and behavior, as well as the total score, for respondents who declared ownership of specific financial instruments.

Investment Type	**n**	**Knowledge**	**Attitude**	**behavior**	**Total FinLit**
Pension fund	55	4.55	2.64	5.78	12.96
Insurance	93	5.18	2.50	6.19	13.87
Investment fund	88	5.46	2.53	6.08	14.07
Stocks	61	5.79	2.53	6.46	14.77
Bonds	103	5.63	2.43	6.32	14.38
Crypto-assets	21	5.05	2.10	6.24	13.38
Cooperative loans	10	4.20	1.70	5.70	11.60
Sustainable (ESG) invest.	17	5.35	2.77	6.35	14.47
Average	–	5.15	2.40	6.14	13.69

Table 4.10: Mean financial literacy scores by investment type

Table 4.10 highlights meaningful differences in financial literacy among investors based on the type of asset they hold. The highest overall literacy scores are observed among individuals who report owning stocks (14.77), ESG (sustainable) investments (14.47), and bonds (14.38). These products typically require a higher degree of financial engagement, understanding of market dynamics, and long-term planning.

Knowledge scores are highest among stockholders (5.79), bondholders (5.63), and ESG investors (5.35), suggesting greater familiarity with financial principles. Conversely, holders of cooperative loans report the lowest knowledge score (4.20), followed by pension fund participants (4.55). These patterns likely reflect the complexity or accessibility of the products themselves: employer-sponsored pensions, for example, may require limited active decision-making.

behavioral scores also follow this trend. Investors in stocks (6.46), ESG funds (6.35), and bonds (6.32) exhibit stronger financial habits, such as saving regularly, budgeting, and paying bills on time. Those invested in pension funds and cooperative loans show lower scores (5.78 and 5.70, respectively), suggesting more passive or less frequent financial involvement.

Interestingly, **attitudinal scores** show a narrower range across asset types, with ESG investors (2.77) and pension fund holders (2.64) at the top. These scores may reflect stronger future orientation or risk awareness, both of which influence investment preferences.

Overall, the results confirm a strong positive correlation between financial literacy and participation in more sophisticated financial instruments. However, differences in access, financial advice, and product complexity may also shape this relationship, suggesting that causality likely runs in both directions.

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[8] Lusardi and Mitchell (2011), *Financial literacy and retirement planning in the United States*; and Van Rooij, Lusardi, and Alessie (2011), *Financial literacy and stock market participation.*

4.3 Determinants of Financial Literacy

To provide a preliminary overview of the relationships among the key variables used in the empirical analysis, Figure 4.2 presents a correlation matrix. This visual tool offers insight into potential associations and multicollinearity before proceeding to multivariate regression. The matrix includes financial and digital financial literacy scores, financial product ownership, and demographic characteristics such as age, gender, and education.

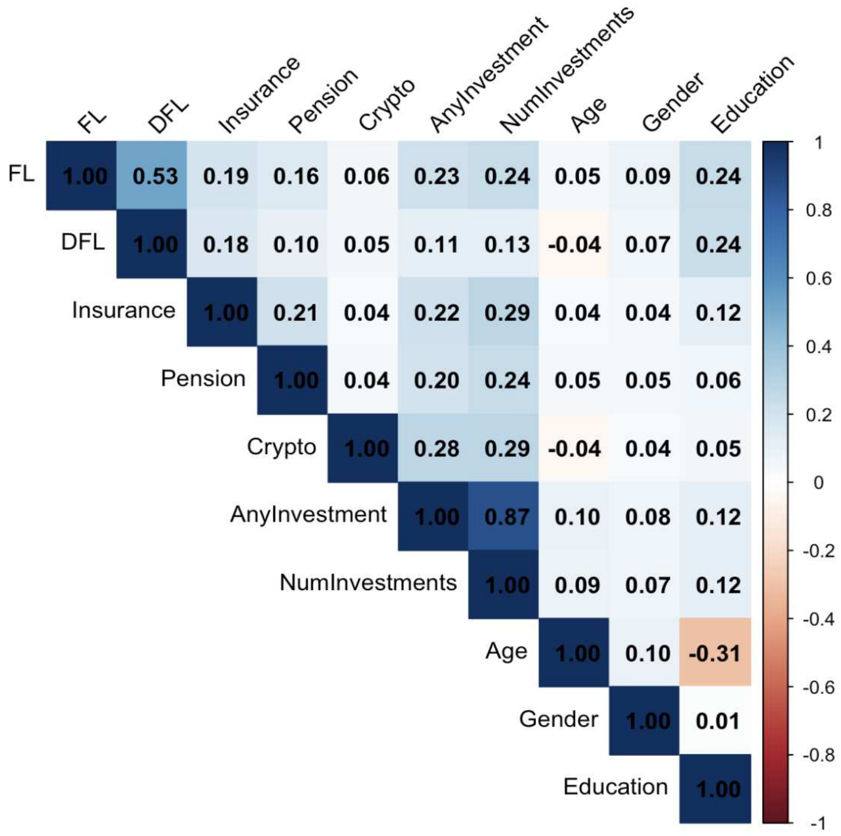

Figure 4.2: Correlation matrix of literacy scores, financial behaviors, and demographics

Figure 4.2 presents the correlation matrix between the key variables used in the empirical analysis, including financial and digital financial literacy scores, financial product ownership, and core demographic characteristics.

Financial literacy (FL) and digital financial literacy (DFL) exhibit a moderate positive correlation ($r = 0.53$), suggesting that while they are related, they capture distinct dimensions of financial capability. Both literacy scores are positively correlated with financial behaviors, though the magnitudes of these associations are modest. FL shows stronger correlations with ownership of insurance ($r = 0.19$), pensions ($r = 0.16$), and the number of investment products held ($r = 0.24$). DFL is only weakly correlated with crypto ownership ($r = 0.05$), echoing the regression results that highlight its limited predictive power in this context.

Education is positively correlated with both FL and DFL ($r = 0.24$), aligning with the broader literature that identifies education as a strong predictor of financial literacy. Age and age squared show very low correlations with literacy and financial behaviors, reinforcing the decision to include them in quadratic form in the regression models. Gender, in this case being male, is only weakly correlated with FL ($r = 0.09$) and essentially uncorrelated with DFL ($r = 0.07$), consistent with the observation that gender differences are more evident in mean literacy levels rather than linear associations.

Overall, none of the correlations exceed 0.9, and most are below 0.3, indicating that multicollinearity is unlikely to bias the multivariate regression estimates. The correlation matrix thus provides a useful preliminary validation of the relationships that will be further explored in the regression analysis.

Regression As a preliminary step, we estimate an OLS regression model using only complete cases, excluding any observations with missing values on the relevant variables. This allows for a clean baseline estimation where all the information used is fully observed and unaltered. The dependent variable is the financial literacy score, which summarizes each respondent's financial knowledge, attitudes, and behavior. The explanatory variables include gender, age (in both linear and squared forms), income bracket, employment status, geographical region, and education level. Categorical variables are coded using dummy variables, with the following reference categories: *female* (gender), *housewives/househusbands* (employment), *Centre* (region), *high school degree* (education), and *€1,751–2,900* (income group). This model is estimated on a sample of 3,323 respondents, with 1,524 individuals excluded due to missing values. The adjusted R^2 is 0.1056, indicating that the model explains approximately 10.6% of the variance in financial literacy scores. Although this suggests that much of the variation remains unexplained, likely due to factors not captured in the survey, such as personality traits, numeracy, or prior financial experience, the model performs reasonably well for socio-demographic predictors. The residual standard error is 2.769, and the model is highly statistically significant, as indicated by an F-statistic of 27.26 (with 15 and 3,322 degrees of freedom) and a p-value below 2×10^{-16}. The coefficient on gender reveals that men score 0.17 points higher than women on average, with a p-value of 0.097. While this is only marginally significant, it supports the well-documented trend of gender gaps in financial literacy often attributed to differences in financial confidence, role expectations, and access to financial education. Age has a statistically significant non-linear effect: the positive coefficient on age (0.133) and the negative coefficient on age squared (-0.0014) imply that financial literacy increases with age but eventually peaks and declines. This inverted U-shaped pattern is typical of many studies and reflects the accumulation of experience followed by possible cognitive decline or disengagement in later years. Income shows an asymmetrical pattern. Respondents in the highest income bracket (above €2,900) score about 0.35 points higher than those in the reference group, and this difference is statistically significant at the 5% level ($p = 0.031$). In contrast, the lowest income group (below €1,750) does not differ significantly from the middle-income group. This suggests that while very high income may be associated with better financial knowledge, possibly due to more complex financial needs or greater exposure, the relationship is not strictly linear. Employment status is a strong predictor. Compared to the reference category of housewives/househusbands, self-employed individuals score 1.29 points higher, employees score 1.07 points higher, and retirees score 1.61 points higher, all significant at the 1% level or better. These results suggest that being economically active, or having accumulated financial experience through work, contributes meaningfully to one's financial literacy. Unemployed or inactive individuals, by contrast, score slightly lower, though this effect is not statistically significant ($p = 0.175$). Geographic disparities are present, though not all are statistically robust. Respondents in the North-West score 0.23 points higher than those in the Centre, but this difference is not significant at conventional levels ($p = 0.107$). Similarly, scores in the North-East do not differ meaningfully from the Centre. However, individuals from the South score 0.27 points lower than those in the Centre ($p = 0.074$), which, although marginal, reflects Italy's well-known regional inequalities in education, economic development, and access to financial services. Education exerts the strongest influence on financial literacy. Individuals with a university degree score 0.52 points higher than those with a high school diploma, while those with only middle school education or less score 1.11 points lower, both with p-values below 0.001. These findings highlight the essential role of formal education in shaping individuals' capacity to understand and manage financial decisions. In summary, this complete-case regression provides a clear and statistically significant mapping of the socio-demographic correlates of financial literacy in Italy. Although the model explains only a portion of the total variance, the patterns observed are consistent with international evidence.

Table 4.11: Determinants of Financial Literacy (Complete-Case Analysis)

	Dependent variable:
	Financial Literacy
Gender: Male	0.169* (0.102)
Age	0.133*** (0.025)
Age^2	−0.001*** (0.0003)
Income: <€1,750	−0.052 (0.106)
Income: >€2,900	0.346** (0.161)
Employment: Self-employed	1.295*** (0.269)
Employment: Employee or Trainee	1.071*** (0.214)
Employment: Unemployed or Inactive	−0.407 (0.300)
Employment: Retired	1.610*** (0.239)
Region: North-West	0.231 (0.143)
Region: North-East	0.122 (0.154)
Region: South	−0.266* (0.149)
Region: Islands	−0.034 (0.179)
Education: Middle school or less	−1.112*** (0.137)
Education: University or more	0.521*** (0.126)
Constant	7.562*** (0.617)
Observations	3,338
R^2	0.110
Adjusted R^2	0.106
Residual Std. Error	2.769 (df = 3322)
F Statistic	27.26*** (df = 15; 3322)
Note:	*p<0.1; **p<0.05; ***p<0.01

Financial Literacy: Hot Deck Imputation

To complement the complete-case analysis and retain the full informational power of the dataset, we re-estimate the financial literacy model using *hot deck imputation* to address missing values. This technique fills in missing data by borrowing values from “donor” individuals who are similar to the respondent with the missing entry, based on other observed characteristics. Specifically, each missing value is replaced with an observed value from another individual with matching or similar values on a set of auxiliary variables. This preserves the distribution and relationships in the data without resorting to arbitrary averages. In our case, we imputed missing values for education, income, occupation, and region using relevant socio-demographic variables including gender, age, and other non-missing covariates.

This approach allows us to include all 4,862 individuals in the model. The regression results provide robust insights into the drivers of financial literacy across a broader and more representative sample. The adjusted R^2 rises to 0.150, indicating a modest improvement in model fit over the complete-case regression. The residual standard error increases slightly to 2.846, reflecting the increased variability introduced by imputation, and the model remains highly significant overall with an F-statistic of 58.24 (15 and 4,846 degrees of freedom, $p < 2.2 \times 10^{-16}$).

The coefficient for gender remains positive and nearly identical to the complete-case model: men score on average 0.15 points higher than women, with a p-value of 0.088. Although only marginally significant, the consistency of this result reinforces the presence of a gender gap in financial capability.

The age profile of financial literacy is again captured through the inclusion of age and age squared. The linear term is positive (0.147), while the squared term is negative (-0.0014), reaffirming the inverted U-shaped relationship. This suggests that financial literacy increases with age as individuals accumulate financial experience but starts to decline in older age, likely due to reduced engagement or cognitive decline.

Education continues to be the strongest determinant. Individuals with only middle school education or less score 1.25 points lower than high school graduates, while those with a university degree score 0.63 points higher. Both effects are statistically significant at the 1% level. These coefficients are slightly larger than in the complete-case model, likely because hot deck imputation preserved individuals who are otherwise underrepresented in higher education groups.

Employment status is also a powerful predictor. Self-employed individuals score 1.51 points higher than the reference group (housewives/househusbands), employees score 1.35 points higher, and retirees score 1.54 points higher, all with p-values well below 0.01. These results highlight the link between active or prolonged engagement in economic life and the development of financial skills. Interestingly, the negative coefficient for the unemployed or inactive group becomes significant in this model (-0.58, $p = 0.016$), suggesting that the broader sample reinforces the vulnerability of these individuals in terms of financial literacy.

Geographic effects are more pronounced in the full sample. Individuals from the North-West score about 0.31 points higher than those in the Centre ($p = 0.012$), and those from the South score 0.32 points lower ($p = 0.0125$). These results reflect Italy’s long-standing regional disparities in both economic opportunity and educational infrastructure. Respondents from the Islands and North-East, however, do not differ significantly from the Centre.

Notably, the coefficients for income brackets are no longer statistically significant in this model. Respondents in the lowest and highest income groups do not show significantly different financial literacy levels compared to the middle-income reference group. This may be due to the imputation process smoothing some of the variance or due to the stronger explanatory power of education and employment status.

Overall, the regression using hot deck imputation validates and extends the findings from the complete-case analysis. The same structural patterns emerge, but with greater statistical power and broader coverage of the population. The consistency across both models reinforces the conclusion that financial literacy is closely tied to educational attainment, employment status, and regional context. Hot deck imputation proves to be a valuable tool for preserving data integrity and maximizing analytical scope without compromising on robustness.

Table 4.12: Determinants of Financial Literacy (Hot Deck Imputation)

	Dependent variable:
	Financial Literacy
Gender: Male	0.148^{*}
	(0.087)
Age	0.147^{***}
	(0.021)
Age^2	-0.001^{***}
	(0.0002)
Income: ¡€1,750	-0.005
	(0.089)
Income: ¿€2,900	0.114
	(0.135)
Employment: Self-employed	1.507^{***}
	(0.224)
Employment: Employee or Trainee	1.352^{***}
	(0.179)
Employment: Unemployed or Inactive	-0.583^{**}
	(0.243)
Employment: Retired	1.545^{***}
	(0.205)
Region: North-West	0.308^{**}
	(0.123)
Region: North-East	0.202
	(0.132)
Region: South	-0.318^{**}
	(0.127)
Region: Islands	-0.012
	(0.156)
Education: Middle school or less	-1.253^{***}
	(0.114)
Education: University or more	0.635^{***}
	(0.109)
Constant	6.358^{***}
	(0.515)
Observations	4,862
R^2	0.153
Adjusted R^2	0.150
Residual Std. Error	2.846 (df = 4846)
F Statistic	58.240^{***} (df = 15; 4846)
Note:	*p<0.1; **p<0.05; ***p<0.01

Chapter 5

Digital Financial Literacy

5.1 Descriptive Statistics

This section presents descriptive statistics for the digital financial literacy (DFL) score and its three components: digital knowledge, digital attitudes, and digital behavior. Table 5.1 summarises the distribution of each component using standard indicators such as the mean, median, quartiles, and standard deviation. Table 5.2 provides the distribution of total DFL scores across four ordinal categories, offering a clearer picture of the score dispersion within the sample.

Component	Min	Q1	Median	Mean	Q3	Max	SD	Max Score
Digital Knowledge	0	0	1	1.29	2	3	1.01	3
Digital Attitude	0	0	1	1.15	2	3	1.03	3
Digital behavior	0	2	2	2.07	3	4	1.04	4
Digital Financial Literacy	0	3	5	4.52	6	10	2.21	10

Table 5.1: Summary statistics for the components of digital financial literacy

Score Range	Count (n)	Percentage
0–2	966	19.87%
3–5	2189	45.02%
6–7	1305	26.84%
8–10	402	8.27%
Total	**4862**	**100.00%**

Table 5.2: Distribution of total digital financial literacy scores in the sample

The summary statistics in Table 5.1 confirm that digital financial literacy levels in the Italian adult population are modest overall, with a sample mean of 4.52 out of 10. The median score is 5, indicating that half of the population scores below the halfway point of the scale. Among the three components, digital behavior shows the highest average (2.07/4), suggesting that respondents are somewhat more familiar with practical digital practices than with underlying concepts or attitudinal caution. Digital knowledge and attitudes both average close to 1 out of 3, pointing to significant room for improvement in awareness and critical engagement with digital financial tools.

Table 5.2 further illustrates the distribution of DFL scores. A large portion of the sample 45.02% falls within the 3–5 range, while nearly 20% score 2 or below. This implies that two-thirds of respondents demonstrate either low or moderate levels of digital financial literacy. Only 8.27% of individuals fall into the highest bracket (8–10), indicating that strong digital financial competency is still relatively rare. These patterns reinforce the need for digital financial education strategies that target conceptual understanding and risk awareness in addition to digital habits.

5.2 Differences within Key Variables

5.2.1 A Focus on Gender Differences

Gender disparities in digital financial literacy (DFL) mirror those found in traditional financial literacy and are an emerging area of academic interest. While digital financial services have expanded access and convenience, not all demographic groups are equally equipped to navigate them securely and confidently. In particular, women tend to score lower than men on digital financial knowledge, behavior, and confidence metrics [1].

These gaps are not necessarily due to differences in ability. Research consistently shows that women are more likely to report low financial confidence, select the "I don't know" option more frequently, and understate their knowledge even when they possess similar levels of understanding as men . These behavioral tendencies can affect performance on digital literacy assessments and may contribute to apparent score gaps.

Moreover, as financial services increasingly shift to digital platforms, the risks associated with inadequate digital literacy including susceptibility to scams, unsafe data practices, and financial exclusion may disproportionately affect women. Studies highlight that women are often more cautious with online financial behavior, yet still face systemic barriers such as lower exposure to fintech, less confidence in managing digital tools, and less targeted outreach in financial education [2].

Against this backdrop, the following section presents empirical evidence from the Italian IACOFI dataset, disaggregating DFL scores by gender. We explore how men and women perform across the three main dimensions of the digital financial literacy index digital knowledge, digital behavior, and digital attitudes and highlight differences in response patterns that may signal variations in confidence or risk aversion rather than actual comprehension.

Component	**Female (Mean)**	**Male (Mean)**	**SD (Female)**	**SD (Male)**
Digital Knowledge	1.24	1.35	1.01	1.00
Digital Attitude	1.10	1.20	1.02	1.04
Digital behavior	2.02	2.12	1.03	1.05
Digital Financial Literacy (Total)	4.36	4.67	2.20	2.20

Table 5.3: Gender differences in digital financial literacy and its components

Table 5.3 presents the average scores and standard deviations for the three components of the digital financial literacy (DFL) index digital knowledge, digital behavior, and digital attitudes disaggregated by gender. The final row shows the total DFL score, computed as the sum of the three components. This breakdown provides a clear overview of gender disparities in digital financial capability across multiple dimensions.

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[1] OECD (2022), *Gender differences in financial and digital literacy*; Balutel and Engert (2023), *Crypto and financial literacy of cryptoasset owners versus non-owners: The role of gender differences*; Bucher-Koenen et al. (2017), *How financially literate are women?*; and Almenberg and Dreber (2015), *Gender, stock market participation and financial literacy.*

[2] See also OECD (2022), *Bridging the Digital Gender Divide*; and GFLEC (2022), *The gender gap in financial and digital literacy: Evidence and policy implications.*

The results confirm a persistent gender gap in digital financial literacy. Across all three components, **men score higher on average than women**. The gap is most pronounced in the digital knowledge dimension (0.11 points), followed by digital attitudes and digital behavior (each with a 0.10-point gap). These differences, while numerically small, are consistent and cumulative, leading to a total DFL gap of 0.31 points on a 10-point scale.

These findings are in line with prior international evidence documenting gender differences in both traditional and digital financial literacy . They reflect not only differences in financial knowledge, but also behavioral tendencies and attitudinal factors that shape how individuals engage with digital financial tools. As in earlier studies, the gender gap in digital knowledge may be partly attributable to women's higher likelihood of selecting "I don't know" responses when faced with uncertainty , a topic we explore in more detail in the next section.

The uniformity of the gap across all dimensions suggests that interventions aimed at promoting digital financial literacy among women should not be limited to improving knowledge alone. Rather, they should also address digital confidence, awareness of online risks, and secure financial behaviors. Doing so is essential to ensure that women can fully and safely benefit from the growing digitisation of financial services .

Given the consistent gender gaps observed across all dimensions of digital financial literacy, we also investigated whether differences in confidence and response behavior contribute to these disparities similar to what has been extensively documented in traditional financial literacy studies . In particular, previous research has shown that women are significantly more likely than men to select "I don't know" when responding to objective financial knowledge questions, often underestimating their actual competence. This phenomenon is interpreted as a reflection of lower confidence rather than lower ability.

To assess whether this pattern extends to the digital context, we analysed the frequency of "I don't know" responses across three digital knowledge questions, disaggregated by gender. If a similar confidence gap is present in digital financial literacy, we would expect to see women choosing the "I don't know" option more frequently than men despite comparable levels of actual digital engagement. The results of this analysis are presented in Table 5.4, and offer additional insight into the role that self-perceived competence and response style may play in shaping gender disparities in digital financial capability.

Gender	**Total "Don't Know"**	**Total Responses**	**% "Don't Know"**
Female	2,537	7,338	34.57%
Male	2,224	7,248	30.68%

Table 5.4: "I don't know" response rate in digital knowledge questions by gender

Note: Each respondent was asked 3 digital knowledge questions. The total number of responses per gender is calculated as: `number_of_individuals` × `3`. For example, total responses for females: `2446 * 3 = 7338`.

Table 5.4 presents the distribution of "I don't know" responses across the three digital knowledge questions, disaggregated by gender. The results indicate that women selected the "I don't know" option in 34.57% of their responses, compared to 30.68% among men. This difference is both substantial and consistent with findings from the traditional financial literacy domain .

The data suggest that, as in earlier studies on financial knowledge , women tend to express lower confidence in their answers, even in areas where their actual competence may be comparable to that of men. Such patterns of response behavior are significant, as they may partially account for the observed gender gap in digital financial knowledge scores. If women are more likely to respond with “I don’t know” when unsure, while men are more inclined to guess, then score-based assessments may systematically underestimate female respondents’ true level of understanding.

These findings support the growing argument in the literature that financial literacy assessments should account for differences in confidence and response styles . In particular, researchers have recommended including measures of self-assessed confidence or using psychometrically adjusted scoring techniques that can differentiate between lack of knowledge and lack of confidence. In the context of digital financial literacy, these adjustments are especially important, as gender disparities in digital confidence may further compound existing barriers to financial inclusion in the digital economy .

In sum, the higher “I don’t know” response rate among women highlights the need for a more nuanced understanding of digital financial capability one that distinguishes not only between what individuals know, but also how confident they feel in expressing that knowledge.

5.2.2 Age Differences

Digital financial literacy (DFL) also varies significantly across age groups, reflecting differences in digital exposure, familiarity with technology, and comfort navigating online financial environments. Prior studies have shown that while younger individuals may possess higher digital fluency, older adults often benefit from experience and more cautious behavior . Conversely, older generations may face challenges related to technological confidence or lack of access to digital financial tools.

To explore age-related patterns in digital financial literacy, we analyse DFL scores across six age groups, covering the three OECD/INFE-aligned components digital knowledge, digital attitude, and digital behavior as well as the overall DFL score. Table 5.5 presents the results, including mean scores, sample sizes, and standard deviations for each group.

Age Group	n	Knowledge	Attitude	behavior	Total DFL
18–29	567	1.28	0.97	1.83	4.08
30–39	880	1.43	1.16	2.14	4.73
40–49	880	1.44	1.30	2.21	4.95
50–59	958	1.30	1.21	2.13	4.64
60–69	841	1.15	1.28	2.13	4.56
70–79	736	1.13	0.89	1.86	3.89

Table 5.5: Mean digital financial literacy scores by age group (n = sample size)

Table 5.5 reveals a clear age gradient in digital financial literacy. Total DFL scores increase from 4.08 in the 18–29 age group to a peak of 4.95 among those aged 40–49, followed by a gradual decline in later life to 3.89 in the 70–79 cohort. This pattern mirrors trends observed in traditional financial literacy and reflects a combination of increasing digital exposure during adulthood and diminishing confidence or access in older age .

Digital knowledge increases from 1.28 (ages 18–29) to a high of 1.44 (ages 40–49), before declining to 1.13 among those aged 70–79. This likely reflects both generational differences in formal digital education and age-related cognitive decline or disengagement from digital financial services .

Digital attitudes show the most pronounced age effect. While middle-aged adults (40–69) express stronger attitudes toward digital responsibility and caution (scores around 1.30), younger (0.97) and older adults (0.89) report significantly lower scores. This suggests that digital risk awareness and sense of responsibility may be underdeveloped among youth and may decline again in later life.

Digital behavior follows a similar trajectory to the total score, increasing from 1.83 (ages 18–29) to 2.21 (ages 40–49), then falling slightly with age. These results reflect greater engagement with secure digital practices in midlife possibly due to active use of digital financial tools for work, parenting, or personal finance and reduced usage or confidence post-retirement.

Overall, the results indicate that while younger cohorts may have higher general digital fluency, they do not necessarily exhibit stronger digital financial literacy. Conversely, older adults may benefit from life experience and caution, but often lag in confidence or usage. These findings reinforce the need for tailored interventions: promoting digital responsibility among youth, and supporting digital inclusion and confidence among seniors .

5.2.3 Income Differences

As financial services increasingly shift to digital platforms, income has emerged as a crucial driver of digital financial inclusion. Higher-income individuals not only enjoy better access to technology and broadband infrastructure, but also tend to have more frequent interactions with financial institutions, increasing their familiarity and confidence in digital settings OECD (2022); Balutel and Engert (2023).[3]

To examine how digital financial literacy (DFL) varies across income levels, we analyse scores across four income categories: <€1,750, €1,751–2,900, >€2,900, and non-disclosure. Table 5.6 presents average scores for each DFL component digital knowledge, digital attitude, and digital behavior as well as the composite DFL index.

Income Group	**n**	**Knowledge**	**Attitude**	**behavior**	**Total DFL**
<€1,750	1425	1.29	1.15	2.04	4.48
€1,751–2,900	1543	1.44	1.28	2.20	4.92
>€2,900	381	1.57	1.30	2.26	5.13
Prefer not to say	1513	1.08	0.99	1.92	3.99

Table 5.6: Mean digital financial literacy scores by income group (n = sample size)

Table 5.6 reveals a strong and consistent income gradient in digital financial literacy. The average DFL score rises from 3.99 among those who declined to report their income to 5.13 among individuals earning >€2,900. This 1.14-point gap on a 10-point scale is both statistically and practically significant.

Digital knowledge increases with income, from 1.08 in the non-disclosure group to 1.57 in the highest income group. This likely reflects both access to financial technology and increased familiarity with digital platforms. **Digital behavior**, which captures secure online practices, also varies meaningfully, ranging from 1.92 to 2.26.

Digital attitudes (related to confidence, caution, and responsibility) also improve with income, but the difference is less pronounced. Still, even small gains in attitudinal metrics can contribute to better outcomes, particularly when combined with higher knowledge and behavior scores.

Overall, these results suggest that digital financial inclusion is shaped not only by access to tools, but also by the capability and confidence to use them effectively. As financial services become increasingly digitised, addressing income-based gaps in digital financial literacy will be essential to ensure equitable access and avoid deepening economic inequality.

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[3] See OECD (2022), *Gender differences in financial and digital literacy*; and Balutel and Engert (2023), *Crypto and financial literacy: Evidence from Canada.*

5.2.4 Geographical Differences

Digital financial literacy (DFL) reflects not only an individual's familiarity with technology and online tools, but also the broader regional infrastructure and digital inclusion landscape. In Italy, persistent north–south disparities in income, education, broadband access, and digital readiness continue to influence the population's ability to securely engage with digital finance OECD (2022); Banca d'Italia (2023).[4]

To explore these dynamics, we disaggregate DFL scores by macro-region: North-West, North-East, Center, South, and Islands. Table 5.7 presents mean scores for each DFL component digital knowledge, attitude, and behavior as well as the total composite score.

Region	**n**	**Knowledge**	**Attitude**	**behavior**	**Total DFL**
North-West	1317	1.39	1.18	2.15	4.72
North-East	952	1.34	1.18	2.11	4.63
Center	915	1.25	1.17	2.04	4.46
South	1139	1.22	1.07	1.97	4.26
Islands	539	1.22	1.18	2.06	4.47

Table 5.7: Mean digital financial literacy scores by geographical area (n = sample size)

As shown in Table 5.7, digital financial literacy follows a geographical gradient similar to traditional financial literacy. Respondents from the North-West report the highest DFL score (4.72), closely followed by the North-East (4.63). These regions consistently outperform others in digital knowledge, behavior, and overall score, suggesting stronger digital infrastructure, broader adoption of financial technologies, and more targeted educational outreach.

The lowest DFL levels are observed in the South (4.26), where digital knowledge and behavior lag behind other regions. Respondents from the Islands score slightly higher overall (4.47), though their knowledge component is among the lowest (1.22), tied with the South.

Digital behavior shows the widest regional variation, from 2.15 in the North-West to 1.97 in the South. This reflects differences in how respondents practice secure online financial habits, such as verifying online providers, managing passwords, and avoiding unsafe sharing of financial information.

Digital attitudes are more uniform across regions, though slightly lower in the South (1.07), suggesting a regional gap in digital confidence and risk perception.

Digital knowledge follows the clearest north–south divide: respondents in the North-West score 1.39, compared to just 1.22 in both the South and Islands. This may reflect disparities in education, exposure to digital contracts and crypto-assets, and institutional trust factors shown to correlate with digital comprehension OECD (2022).

These findings confirm that regional inequalities extend beyond access and income, influencing the population's capacity to engage safely and effectively with digital finance. As Italy continues its digital transition, targeted interventions in the South and Islands will be crucial to bridge the digital divide and promote equitable financial inclusion.

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[4] See OECD (2022), *Gender differences in financial and digital literacy*; and Banca d'Italia (2023), *Risultati dell'indagine sull'alfabetizzazione finanziaria degli adulti: edizione 2023.*

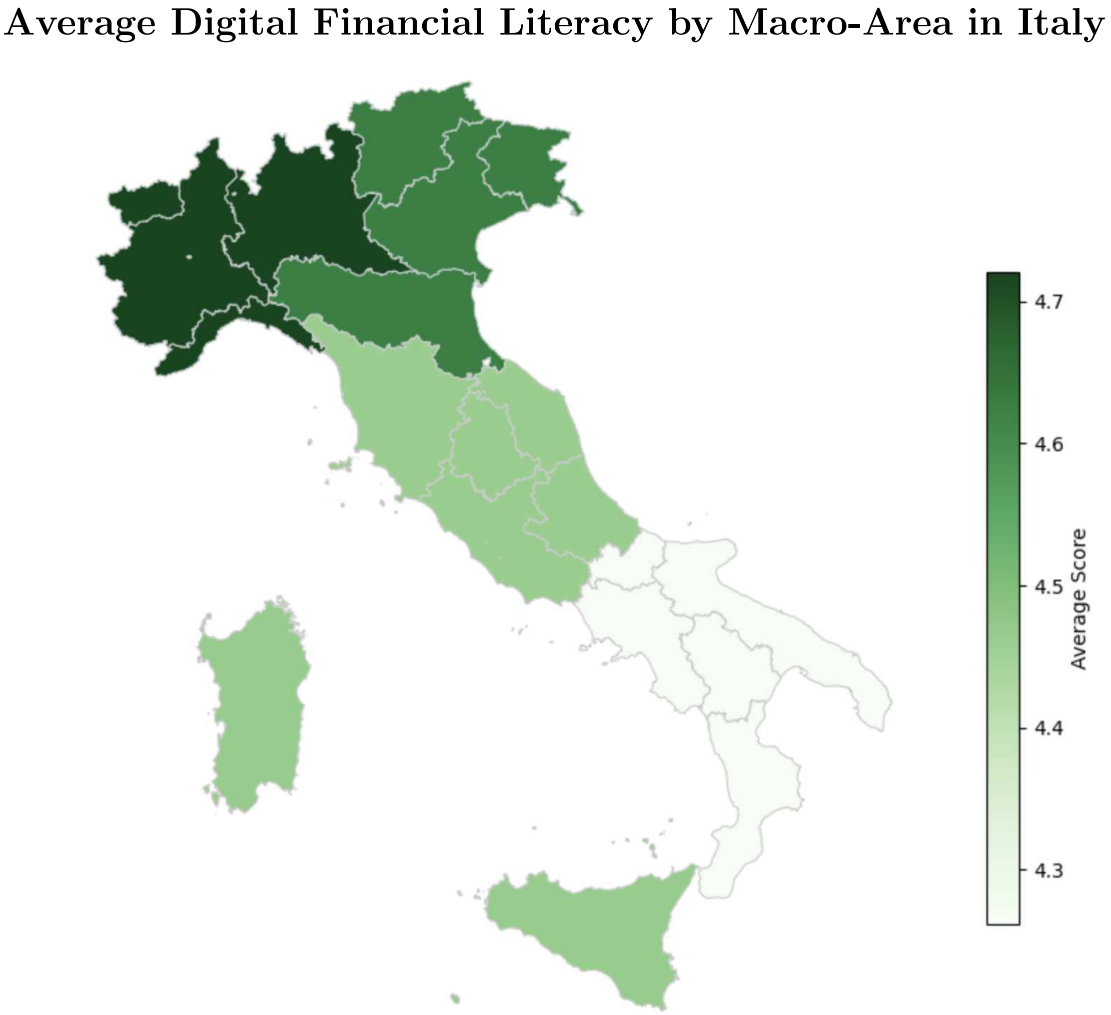

Figure 5.1: Regional differences in average digital financial literacy scores across Italy, based on the 2023 IACOFI dataset. Scores are calculated using the OECD/INFE methodology and combine digital knowledge, behavior, and attitude into a composite score out of 10. Macro-regions are used for consistency with official survey reporting.

Figure 5.1 offers a spatial visualization of the regional disparities in digital financial literacy presented in Table 5.7. By aggregating regions into macro-areas, the map illustrates the north–south divide in digital capability with visual immediacy.

This graphical representation complements the table by highlighting the concentration of higher DFL scores in northern areas and the relative disadvantage observed in the South and Islands. It also provides a clearer spatial sense of where regional interventions may be most urgently needed.

5.2.5 Education Differences

As with traditional financial literacy, education plays a key role in shaping digital financial literacy (DFL). Higher educational attainment is associated with greater digital familiarity, stronger cognitive skills, and more frequent use of online financial tools all of which contribute to higher digital financial competence Balutel and Engert (2023); OECD (2022).[5] These effects are particularly important as financial services shift online, increasing the need for secure and informed digital participation.

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[5] See Balutel and Engert (2023); and OECD (2022), *Gender differences in financial and digital literacy.*

In what follows, we explore education-related differences across the three components of the DFL index digital knowledge, digital attitude, and digital behavior as well as the composite score. Table 5.8 reports the mean scores, standard deviations, and sample sizes for each educational group.

Education Level	**n**	**Knowledge**	**Attitude**	**behavior**	**Total DFL**
Middle school degree or below	1048	0.94	0.85	1.77	3.56
High school degree	2841	1.36	1.17	2.12	4.65
University degree and above	973	1.49	1.43	2.25	5.17

Table 5.8: Mean digital financial literacy scores by education level (n = sample size)

Table 5.8 reveals substantial educational gradients in digital financial literacy. Respondents with a university degree have the highest average DFL score (5.17 out of 10), followed by high school graduates (4.65), and those with only a middle school education (3.56). This 1.61-point gap between the highest and lowest groups underscores the role of formal education in shaping digital competence and safe online behavior.

Digital knowledge shows a particularly sharp difference across education levels: university-educated individuals score 1.49 on average, compared to just 0.94 among those with a middle school background. This gap reflects differences in exposure to digital terminology and legal-financial concepts, as well as broader disparities in digital access and use.

Digital attitudes which capture trust, caution, and responsibility in online settings also rise with education, from 0.85 to 1.43. This suggests that formal education may help instill awareness of digital risks and promote prudent online behavior.

Digital behavior scores follow a similar pattern: more educated individuals report greater adoption of secure digital practices such as verifying providers and managing passwords. While high school and university groups are relatively close (2.12 vs. 2.25), those with less than a high school education lag behind considerably (1.77).

Overall, these findings reinforce the importance of integrating digital and financial literacy into education systems, especially for students from disadvantaged backgrounds. As digital finance becomes increasingly essential for accessing banking, insurance, and government services, ensuring broad digital inclusion will require closing these foundational education-based gaps.

5.2.6 Occupation Differences

Digital financial literacy (DFL) is shaped not only by technological access but also by the nature of individuals' financial responsibilities and digital exposure in their daily lives. Occupational status plays a key role, as those who are employed or self-employed may regularly interact with digital platforms for banking, work-related transactions, or retirement contributions. In contrast, individuals who are inactive in the labor force, unemployed, or in domestic roles may have fewer incentives or opportunities to acquire digital financial skills .[6]

To explore how DFL varies across occupational groups, we classify respondents into five categories: *Employee or Trainee*, *Self-employed*, *Retired*, *Housewife/Househusband*, and *Unemployed or Inactive*. Table 5.9 reports average scores for each DFL component knowledge, attitude, and behavior as well as the composite index.

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[6] Balutel and Engert (2023), *Crypto and financial literacy: Evidence from Canada.*

Occupation Group	n	Knowledge	Attitude	behavior	Total DFL
Employee or Trainee	2494	1.45	1.22	2.18	4.85
Self-employed	401	1.38	1.28	2.26	4.92
Retired	1172	1.14	1.08	2.04	4.25
Housewife/Househusband	349	0.84	1.00	1.68	3.52
Unemployed or Inactive	446	1.12	0.98	1.70	3.80

Table 5.9: Mean digital financial literacy scores by revised occupational status (n = sample size)

Table 5.9 reveals substantial occupational disparities in digital financial literacy. The highest scores are observed among self-employed individuals (4.92), followed closely by employees or trainees (4.85). These groups report the strongest performance across all three DFL components, reflecting frequent interaction with digital tools in both personal and professional contexts.

Retired respondents score moderately (4.25), with relatively strong behavior scores (2.04) that may stem from cautious habits built over time, even if digital familiarity is lower. Meanwhile, individuals in the housewife/househusband group show the lowest total DFL score (3.52), driven primarily by limited digital knowledge (0.84) and lower engagement in secure digital behaviors (1.68).

The *unemployed or inactive* group reports similarly low performance (3.80), suggesting that exclusion from the workforce may also reduce digital confidence and skill-building. While their knowledge scores are modest (1.12), their digital attitudes and behaviors remain low relative to the workforce-active groups.

These findings underscore the digital divide embedded within labor market participation. Without sufficient motivation or necessity to engage in digital financial activities, individuals outside the workforce may lack both awareness and confidence in managing financial tasks online. Targeted digital inclusion strategies, especially those aimed at inactive and domestic groups, are essential to close these gaps and prevent further exclusion in an increasingly digital financial system.

5.2.7 Portfolio Composition Differences

Participation in financial markets increasingly requires not only economic knowledge but also digital fluency. Investors must be able to evaluate online platforms, manage secure access to financial accounts, and assess risks associated with digital financial products. As such, digital financial literacy (DFL) may influence the likelihood of engaging with different types of investments, while investment experience may in turn reinforce digital skills [7].

To explore this relationship, Table 5.10 presents mean scores for each DFL component digital knowledge, attitude, and behavior as well as the composite DFL index, broken down by investment type.

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[7] Balutel and Engert (2023), *Crypto and financial literacy: Evidence from Canada.*

Investment Type	**n**	**Knowledge**	**Attitude**	**behavior**	**Total DFL**
Pension fund	55	1.27	1.53	2.36	5.16
Insurance	93	1.73	1.73	2.33	5.80
Investment fund	88	1.66	1.67	2.34	5.67
Stocks	61	1.92	1.74	2.41	6.07
Bonds	103	1.70	1.70	2.37	5.77
Crypto-assets	21	1.57	1.14	2.38	5.10
Cooperative loans	10	1.40	0.90	2.50	4.80
Sustainable (ESG) invest.	17	1.77	2.00	2.29	6.06
Average	–	1.63	1.55	2.37	5.55

Table 5.10: Mean digital financial literacy scores by investment type

Table 5.10 shows that digital financial literacy varies across investment types. Respondents who report owning stocks (6.07), ESG investments (6.06), and insurance (5.80) exhibit the highest composite DFL scores, well above the sample average (5.55). These products typically require users to engage with digital interfaces for account access, performance tracking, and product selection.

Digital knowledge is highest among stockholders (1.92) and ESG investors (1.77), suggesting greater familiarity with online financial concepts, legal distinctions, and risks. Meanwhile, pension fund holders (1.27) and cooperative loan participants (1.40) report the lowest digital knowledge scores, reflecting either limited digital exposure or more passive involvement.

Digital attitude scores, which capture caution and confidence in digital settings, show a clear peak among ESG investors (2.00). Crypto investors, despite scoring well on behavior, display lower digital attitudes (1.14), possibly indicating less concern about risks or overconfidence in digital environments.

Digital behavior scores remain relatively stable across asset classes, with cooperative loan holders slightly outperforming the average. This may suggest that behavior (e.g., password management or verifying providers) is less sensitive to the specific product and more a function of broader digital habits.

Overall, the results confirm that individuals engaged with more sophisticated or digitally mediated investment products tend to score higher on DFL metrics. However, the variation in digital attitudes across asset classes indicates that confidence and caution, not just competence, are essential components of responsible digital investing.

5.3 Determinants of Digital Financial Literacy

To investigate the socio-demographic determinants of digital financial literacy (DFL) among Italian adults, we estimate an ordinary least squares (OLS) regression model in which the dependent variable is the digital financial literacy score (ranging from 0 to 10). The explanatory variables include gender, age (entered both linearly and as a squared term), income level, employment status, region of residence, and educational attainment. This model is estimated using complete case analysis, meaning that individuals with missing values in any of the relevant variables are excluded. As a result, the final sample includes 3,323 observations out of 4,862 total. Although this approach ensures that only observed responses are used, it comes at the cost of reduced statistical power due to a smaller sample size. The model yields an adjusted R^2 of 0.0737, indicating that approximately 7.4% of the variation in digital financial literacy scores can be explained by the included predictors. While this value is relatively low, it is typical in social science research, where unobserved factors such as digital experience, personal motivation, or cognitive abilities are likely to play a major role. Nonetheless, the overall model is statistically significant (F-statistic $= 18.69$, $p < 0.001$), confirming that the set of predictors collectively contributes to explaining differences in digital financial literacy. Several notable patterns emerge. *Gender* is marginally significant: males score on average 0.15 points higher than females ($p \approx 0.053$), holding other characteristics constant. While modest in size, this effect aligns with previous findings suggesting greater self-reported digital confidence among men. The inclusion of both *age* and *age squared* reveals a statistically significant non-linear relationship. The positive coefficient on age and the negative coefficient on its square indicate that digital financial literacy increases with age up to a point, then begins to decline. This inverted-U pattern likely reflects the accumulation of digital skills through work and life responsibilities, followed by a decline in digital engagement or cognitive flexibility among older individuals. *Income* also plays a role. Individuals in the lowest income bracket (less than €1,750 per month) score significantly lower on the DFL index (-0.21 points), while those in the highest bracket (more than €2,900) do not differ significantly from the reference group. This suggests that digital financial proficiency may be particularly lacking among lower-income individuals, whereas high income alone does not guarantee higher digital capability. *Employment status* is a strong predictor of DFL. Self-employed individuals score 0.64 points higher, and employees or trainees score 0.56 points higher than the reference group (housewives/househusbands). Retired individuals also perform significantly better, with a 0.73-point increase. These results likely reflect the increased necessity and frequency of interacting with digital tools for financial purposes among these groups. *Regional differences* mirror broader patterns in digital inclusion across Italy. Residents in the North-West score significantly higher than those in the Centre (reference category), while those in the South exhibit marginally lower scores ($p \approx 0.099$). No significant differences are found for the North-East or the Islands. *Education* emerges as one of the most influential variables. Compared to individuals with a high school diploma (reference group), those with only a middle school education or less score 0.67 points lower, while those with a university degree or higher score 0.36 points higher. This confirms the importance of formal education in equipping individuals with the skills needed to navigate digital financial environments. In summary, the regression reveals meaningful and statistically robust associations between digital financial literacy and socio-demographic characteristics. Although the model explains a modest proportion of the total variance, it highlights clear patterns of inequality, suggesting that targeted interventions may be necessary to bridge digital financial gaps among disadvantaged groups.

Table 5.11: Determinants of Digital Financial Literacy

	Dependent variable:
	Digital Financial Literacy
Gender: Male	0.145^{*}
	(0.075)
Age	0.063^{***}
	(0.018)
Age^2	-0.001^{***}
	(0.0002)
Income: <€1,750	-0.209^{***}
	(0.078)
Income: >€2,900	0.047
	(0.118)
Employment: Self-employed	0.637^{***}
	(0.198)
Employment: Employee or Trainee	0.561^{***}
	(0.157)
Employment: Unemployed or Inactive	0.129
	(0.220)
Employment: Retired	0.726^{***}
	(0.176)
Region: North-West	0.273^{***}
	(0.105)
Region: North-East	0.064
	(0.113)
Region: South	-0.180^{*}
	(0.109)
Region: Islands	0.039
	(0.131)
Education: Middle school or less	-0.666^{***}
	(0.100)
Education: University or more	0.362^{***}
	(0.092)
Constant	3.082^{***}
	(0.453)
Observations	3,323
R^2	0.0778
Adjusted R^2	0.0737
Residual Std. Error	2.035 (df = 3322)
F Statistic	18.690^{***} (df = 15; 3322)
Note:	*p<0.1; **p<0.05; ***p<0.01

Digital Financial Literacy: Hot Deck Imputation

To address the issue of missing data in the socio-demographic variables, we apply a *hot deck imputation* strategy. This method fills in missing values by selecting observed values from similar individuals (donors) based on a set of matching variables. In our case, missing values for education, income, occupation, and region are imputed based on combinations of gender, age (imputed), and other observed socio-demographic variables. This approach allows us to preserve the original distribution of the data while increasing the sample size from 3,323 to 4,862 observations, thus enhancing the precision of the estimates.

The regression model with hot deck imputation reveals statistically robust and theoretically consistent patterns (Table 5.12). The adjusted R^2 is 0.0879, indicating that approximately 8.8% of the variance in digital financial literacy scores is explained by the socio-demographic variables. While modest, this level of explanatory power is expected given the multifactorial nature of digital literacy, which is likely influenced by personal interests, technological access, and unobserved factors such as motivation or cognitive ability.

Age once again exhibits a significant nonlinear relationship with digital financial literacy. The positive coefficient for age ($\beta = 0.073$) and the negative coefficient for age squared ($\beta = -0.00075$) together suggest an inverted-U pattern: DFL increases with age, peaks during middle adulthood, and declines later in life. This is consistent with the life-cycle hypothesis and mirrors the trend observed for traditional financial literacy.

Men tend to score higher than women on average, although the effect is only weakly significant ($\beta = 0.112$, $p < 0.1$). This persistent gender gap echoes findings in the financial literacy literature and may reflect differences in digital confidence or exposure to financial tools online.

Income levels show differentiated effects. Individuals in the lowest income group (less than €1,750/month) score significantly lower ($\beta = -0.142$, $p < 0.05$), highlighting the digital divide affecting economically disadvantaged populations. Interestingly, individuals in the highest income group (over €2,900/month) do not differ significantly from the reference group, suggesting that high income alone does not guarantee higher digital financial skills.

Employment status is a strong predictor. Self-employed individuals and employees both score significantly higher than housewives/househusbands (the reference group), with coefficients of 0.83 and 0.77 respectively. Retirees also perform well ($\beta = 0.85$), possibly reflecting greater life experience and technological adaptation. In contrast, the unemployed/inactive group does not differ significantly, indicating heterogeneity within this category.

Geographic disparities persist. Residents in the North-West show significantly higher scores ($\beta = 0.25$, $p < 0.01$), while those in the South and Islands do not differ meaningfully. This regional gap reflects long-standing inequalities in digital infrastructure and educational access across Italy.

Education has the most powerful effect. Respondents with a university degree score nearly half a point higher than those with a high school diploma ($\beta = 0.42$), while those with only a middle school education score almost 0.87 points lower. This confirms that digital financial proficiency is closely tied to formal educational attainment.

In summary, the hot deck-imputed regression confirms and refines the trends seen in the complete case analysis. The findings underscore how digital financial literacy is shaped by a complex interplay of age, education, employment, and regional context, and highlight the digital divide affecting women, older adults, and low-income individuals. These patterns should inform the design of inclusive financial education and digital empowerment initiatives across the country.

Table 5.12: Determinants of Digital Financial Literacy (Hot Deck Imputation)

	Dependent variable:
	Digital Financial Literacy
Gender: Male	0.112*
	(0.064)
Age	0.073***
	(0.015)
Age^2	$-$0.00075***
	(0.00016)
Income: ¡€1,750	$-$0.142**
	(0.066)
Income: ¿€2,900	$-$0.007
	(0.100)
Employment: Self-employed	0.834***
	(0.166)
Employment: Employee or Trainee	0.771***
	(0.133)
Employment: Unemployed or Inactive	0.266
	(0.180)
Employment: Retired	0.854***
	(0.152)
Region: North-West	0.246**
	(0.091)
Region: North-East	0.169*
	(0.098)
Region: South	$-$0.127
	(0.094)
Region: Islands	0.063
	(0.115)
Education: Middle school or less	$-$0.866***
	(0.084)
Education: University or more	0.418***
	(0.080)
Constant	2.312***
	(0.381)
Observations	4,862
R^2	0.091
Adjusted R^2	0.088
Residual Std. Error	2.108 (df = 4846)
F Statistic	32.21*** (df = 15; 4846)
Note:	*p<0.1; **p<0.05; ***p<0.01

Chapter 6

Determinants of Financial Decisions

6.1 Insurance Decisions

Insurance is a key component of household financial security, offering protection against income loss, unexpected expenses, and life-cycle risks. Despite its importance, demand for insurance varies widely across individuals and demographic groups. A growing body of evidence suggests that financial literacy plays a pivotal role in shaping individuals' understanding of insurance products, their perceived need for protection, and their willingness to pay for coverage .[1]

In the Italian context, insurance uptake has been historically low compared to other European countries, especially in the South and among women. According to Millo and Carmeci (2014), spatial disparities persist across Italy, with higher levels of insurance density in the Centre and North, and significantly lower levels in the South and Islands .[2] This geographical divide is partially explained by differences in income, education, trust in financial institutions, and the distribution of financial advisors and agents.

Luciano, Outreville, and Rossi (2015) analyzed microeconomic determinants of life insurance demand in Italy using the Bank of Italy's Survey on Household Income and Wealth (SHIW). Their findings show that life insurance ownership is positively associated with income, educational attainment, employment status, and financial market proximity (e.g., ownership of stocks or real estate) .[3] Importantly, they demonstrate that women are consistently less likely to own life insurance than men, even after controlling for income and education.

This gender gap aligns with broader findings in the literature on financial literacy. Women tend to be more risk-averse and less confident in financial decision-making, which in turn affects their insurance behavior .[4] Additionally, preferences for precautionary saving and the presence of dependents influence insurance participation, with households with young children showing greater likelihood to purchase term insurance as a form of income replacement .[5]

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[1] Lusardi and Mitchell (2011), *Financial Literacy and Retirement Planning in the United States*; Fornero and Monticone (2011), *Financial Literacy and Pension Plan Participation in Italy*; Van Rooij, Lusardi, and Alessie (2011), *Financial Literacy and Stock Market Participation.*

[2] Millo and Carmeci (2014), *A Subregional Panel Data Analysis of Life Insurance Consumption in Italy, Journal of Risk and Insurance.*

[3] Luciano, E., Outreville, J.F., and Rossi, M. (2015), *Life Insurance Demand: Evidence from Italian Households; A Microeconomic View and Gender Issues*, Collegio Carlo Alberto Working Paper.

[4] Bucher-Koenen et al. (2017), *How Financially Literate Are Women?*; Balutel and Engert (2023), *Crypto and Financial Literacy: Evidence from Canada*; Gandolfi and Miners (1996), *Gender-Based Differences in Life Insurance Ownership.*

[5] Lewis, F.D. (1989), *Dependents and the Demand for Life Insurance*; Bernheim et al. (2003), *The Mismatch*

The demand for insurance in Italy is also shaped by structural factors, such as employment type and city size. Self-employed individuals, for example, are significantly more likely to own insurance, as they often lack employer-provided coverage and face higher income volatility .[6] Moreover, insurance demand exhibits a concave relationship with age, rising in early adulthood and peaking around age 43, consistent with life-cycle models that link insurance purchases to bequest motives and income replacement needs .[7]

Interestingly, education appears to play a dual role. While higher education is associated with greater insurance ownership, the effect is largely mediated by financial literacy. When financial market participation is accounted for, the direct effect of education often disappears, suggesting that financial capability, rather than formal schooling per se, is the critical factor .[8]

Another key determinant is financial proximity, defined as the individual's exposure to or familiarity with financial instruments and markets. Luciano et al. (2015) find that homeownership and stock market participation are strong predictors of life insurance demand. This suggests that individuals who are already engaged in financial decision-making are more likely to understand and appreciate the value of insurance .

Finally, institutional factors such as the presence of financial advisors, the density of insurance agencies, and regional economic conditions all contribute to shaping insurance behavior. In Italy, the role of bancassurance and tied agents remains particularly relevant, especially in regions where digital financial access is more limited .[9]

In sum, the literature reveals that insurance decisions in Italy are closely intertwined with financial literacy, gender, income, geography, and market exposure. As the next section will show, both traditional and digital financial literacy scores are positively associated with insurance ownership, even after controlling for standard demographic variables. This suggests that improving financial capability may represent a key lever for increasing participation in insurance markets, particularly among underserved groups.

Between Life Insurance Holdings and Financial Vulnerabilities.

[6] Hammond et al. (1967), *Determinants of Household Life Insurance Premium Expenditure: An Empirical Investigation.*

[7] Yaari (1965), *Uncertain Lifetime, Life Insurance, and the Theory of the Consumer*; Schlesinger (1981), *The Optimal Level of Deductibility in Insurance Contracts.*

[8] Outreville (2015), *The Relationship Between Relative Risk Aversion and the Level of Education*; Millo and Carmeci (2014), op. cit.

[9] ANIA (2013), *L'Assicurazione Italiana 2012–2013*; Millo and Carmeci (2014), op. cit.

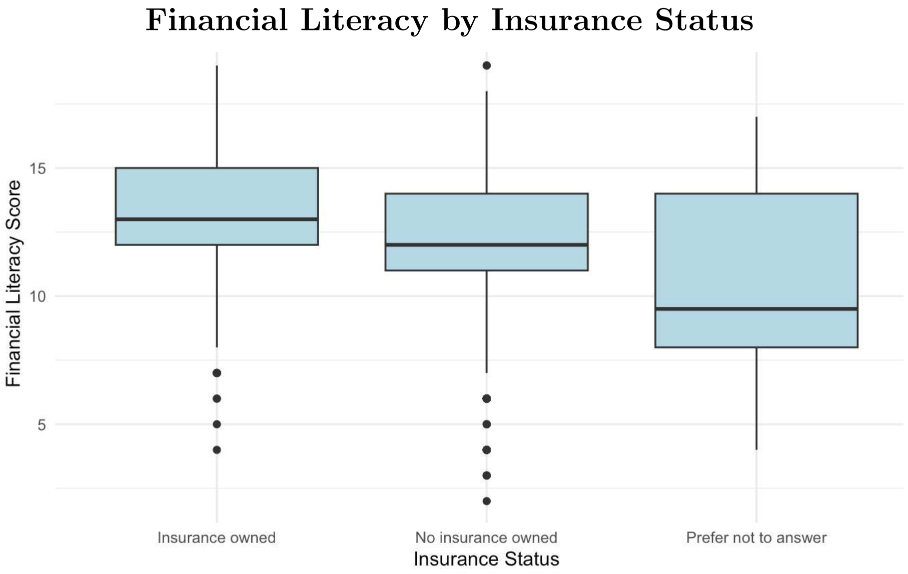

Figure 6.1: Boxplot of financial literacy scores by insurance ownership status.

Figure 6.1 displays the distribution of financial literacy scores across three groups based on insurance ownership status. Individuals who report owning insurance exhibit the highest median financial literacy scores, along with a relatively narrow interquartile range. This suggests a positive association between financial literacy and the likelihood of holding insurance. In contrast, those without insurance display a slightly lower median and a wider spread, indicating greater variability in financial capability. Notably, respondents who preferred not to disclose their insurance status show the lowest median and the largest dispersion in scores, which may reflect underlying uncertainty, lower financial awareness, or disengagement with financial products.

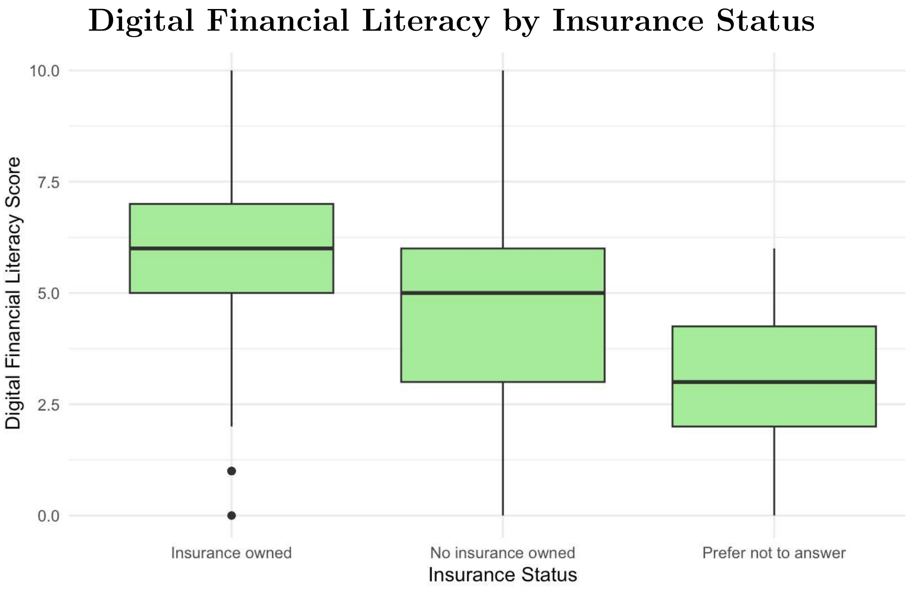

Figure 6.2: Boxplot of digital financial literacy scores by insurance ownership status.

Figure 6.2 displays the distribution of digital financial literacy (DFL) scores by insurance ownership status. The boxplot shows that insured individuals have the highest median DFL scores and a more concentrated distribution, indicating more consistent digital financial competence. Those without insurance have a lower median and greater variability, while respondents who preferred not to answer exhibit the lowest central tendency and the widest spread.

These differences align with the hypothesis that digital capabilities play an important role in navigating and accessing insurance services. As digital distribution channels become increasingly common in the insurance market, digital literacy may act as both a gateway and a barrier to participation.

6.1.1 Determinants of Insurance Decisions

To investigate the relationship between financial capability and insurance participation, we estimate two separate binary logistic regression models using maximum likelihood estimation. The dependent variable in both models is a binary indicator of insurance ownership, equal to 1 if the respondent reports owning a non-mandatory insurance product, and 0 otherwise.

The first model includes the total financial literacy score (ranging from 0 to 20) as the sole explanatory variable. The second model replaces this with the digital financial literacy score (ranging from 0 to 10). These models allow us to evaluate whether either form of financial literacy is a significant predictor of insurance uptake, independently of other covariates.

Model 1: Financial Literacy. In the first regression, the estimated coefficient on financial literacy is $\hat{\beta}_1 = 0.306$, with a standard error of 0.023, yielding a z-statistic of 13.26 and a p-value less than 0.001. The intercept is -6.241 (SE $= 0.302$), also statistically significant at the 1% level. These results indicate that higher financial literacy is strongly and positively associated with the probability of owning insurance.

In terms of interpretation, each additional point in the financial literacy score increases the *log-odds* of insurance ownership by approximately 0.306 units. Exponentiating this coefficient gives an odds ratio of $\exp(0.306) \approx 1.358$, meaning that a one-point increase in financial literacy raises the odds of owning insurance by roughly 35.8%. This is a substantial effect, particularly given that the score spans 20 points. For instance, the odds of owning insurance for someone with a score of 15 are approximately 7.5 times higher than for someone with a score of 5, assuming a linear log-odds relationship.

Model 2: Digital Financial Literacy. In the second model, we use the digital financial literacy (DFL) score as the predictor. The estimated coefficient is $\hat{\beta}_1 = 0.354$ (SE $= 0.029$), with a z-statistic of 12.02 and a p-value again less than 0.001. The intercept is -4.432 (SE $= 0.181$), indicating a low baseline probability of insurance ownership among individuals with no digital financial literacy.

This coefficient translates to an odds ratio of $\exp(0.354) \approx 1.425$, suggesting that each additional point in the DFL score increases the odds of owning insurance by approximately 42.5%. Since the DFL score ranges from 0 to 10, a person with the maximum score has odds of insurance ownership that are more than five times higher than a person with a score of zero.

FL and DFL as Predictors of Insurance Ownership

Table 6.1: Insurance Ownership Model 1 and Model 2

	Dependent variable:	
	has_insurance	
	FL	DFL
	(1)	(2)
Financial Literacy	0.306*** (0.023)	
Digital Financial Literacy		0.354*** (0.029)
Constant	−6.241*** (0.302)	−4.432*** (0.181)
Observations	4,862	4,862
Log Likelihood	−1,127.557	−1,150.283
Akaike Inf. Crit.	2,259.115	2,304.566
Note:	*p<0.1; **p<0.05; ***p<0.01	

Interpretation and Implications While both models yield statistically significant and substantively meaningful coefficients, they differ slightly in model fit. Model 1 has a residual deviance of 2255.1 and an AIC of 2259.1, whereas Model 2 has a higher residual deviance (2300.6) and AIC (2304.6). This suggests that the traditional financial literacy score explains slightly more of the variation in insurance ownership, though both predictors are strong on their own.

These results confirm that both forms of financial capability traditional and digital are significant predictors of insurance uptake. Individuals who are more financially literate, in either domain, are considerably more likely to hold insurance. This is consistent with economic theory, which posits that individuals with higher financial knowledge are better able to assess risks, understand the benefits of insurance, and navigate complex product offerings .[10]

Furthermore, the slightly stronger predictive power of the digital financial literacy score highlights the importance of digital competence in accessing and managing insurance products in today's environment. As insurance distribution channels increasingly move online, digital financial capability may become an even more critical determinant of participation.

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[10] Lusardi and Mitchell (2011); Fornero and Monticone (2011); Luciano, Outreville, and Rossi (2015).

6.2 Saving Decisions

Saving is a fundamental component of household financial well-being. It enables individuals and families to smooth consumption over time, build precautionary buffers, and prepare for large expenses such as education, home purchases, or retirement. In the economics literature, saving decisions are typically modeled within a life-cycle framework in which forward-looking individuals allocate resources to maximize expected utility over time, subject to income uncertainty, interest rates, and intertemporal preferences.

However, empirical evidence consistently shows that many individuals deviate from the predictions of standard economic models. One major factor contributing to suboptimal saving behavior is the lack of financial literacy .[11] Financial literacy encompasses knowledge of basic economic and financial concepts such as interest compounding, inflation, risk diversification, and budgeting, all of which are crucial for evaluating saving strategies.

In Italy, household saving behavior reflects a complex interplay of cultural, institutional, and financial factors. Traditionally, Italians were considered high savers by international standards. During the 1980s and 1990s, the household saving rate regularly exceeded 20% of disposable income. However, since the early 2000s, the saving rate has declined sharply, reaching historically low levels of around 8–10% in recent years. This decline has raised concerns about retirement adequacy and vulnerability to income shocks [12].

Data from the Bank of Italy's Survey on Household Income and Wealth (SHIW) show that saving behavior is highly heterogeneous across regions, age groups, and income brackets. Younger individuals, in particular, save less than older cohorts, and households in Southern Italy are less likely to report positive saving rates. These differences are partially explained by income disparities, but also reflect varying degrees of financial capability and trust in the financial system [13].

Households save for multiple motives, which include precautionary purposes (to insure against income volatility or unexpected expenses), planned consumption (e.g., education, housing), and retirement. In Italy, the role of the precautionary motive is particularly strong due to labor market rigidity and limited unemployment protection, especially for younger workers and the self-employed .[14] Moreover, a significant portion of household saving is allocated toward homeownership, often seen as a form of safe, tangible investment in an environment of low trust in financial intermediaries.

Italy's pension system has historically been based on a pay-as-you-go (PAYG) structure, with relatively generous defined benefit schemes. This led many Italians to rely heavily on public pensions as their primary source of retirement income. However, demographic changes, including population aging and declining birth rates, have challenged the sustainability of this system. Starting from the 1990s, several reforms progressively reduced replacement rates, increased the retirement age, and introduced notional defined contribution schemes .[15].

Despite these reforms, participation in supplementary pension plans remains limited. According to Luciano et al. (2015), only a small fraction of households actively contribute to private pension schemes. Financial literacy appears to play a decisive role: individuals with higher financial knowledge are more likely to engage in retirement planning, understand pension statements, and calculate retirement needs .[16]

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[11] Lusardi and Mitchell (2011), *Financial Literacy and Retirement Planning in the United States*; Jappelli and Padula (2013), *Investment in Financial Literacy and Saving Decisions.*

[12] Millo and Carmeci (2014), *A Subregional Panel Data Analysis of Life Insurance Consumption in Italy*, Journal of Risk and Insurance.

[13] Luciano, E., Outreville, J. F., and Rossi, M. (2015), *Life Insurance Demand: Evidence from Italian Households.*

[14] Jappelli and Padula (2015), *The Joint Determination of Financial Literacy and Saving Behavior*, Journal of Pension Economics and Finance.

[15] Jappelli and Padula (2013), op. cit.; Bucher-Koenen et al. (2017), *How Financially Literate Are Women?*

Numerous empirical studies document a strong, positive relationship between financial literacy and saving behavior. In their theoretical model, Jappelli and Padula (2013) show that financial knowledge enhances investment returns and reduces participation costs, thus incentivizing higher saving rates. Their empirical findings confirm that literacy and wealth accumulation are jointly determined and positively correlated across the life cycle. Moreover, financial literacy acquired early in life has persistent effects, supporting the case for early financial education .

The OECD also emphasizes that financially literate individuals are more likely to engage in retirement planning, save regularly, and accumulate diversified portfolios. In contrast, low-literacy individuals tend to rely on informal saving mechanisms, delay retirement planning, and may underestimate future financial needs.

In Italy, the decline in saving rates, the challenges to the public pension system, and the shift toward individual responsibility in financial planning underscore the importance of understanding saving behavior in light of financial literacy. This chapter explores how both traditional and digital financial literacy relate to saving outcomes among Italian adults.

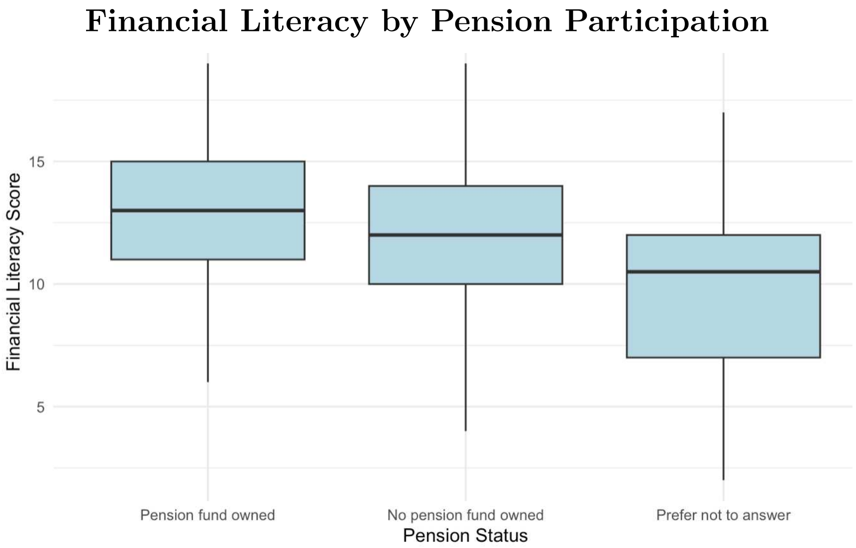

Figure 6.3: Boxplot of financial literacy scores by supplementary pension participation status.

Figure 6.3 illustrates the distribution of financial literacy scores across individuals grouped by ownership of a supplementary pension product. Those who report owning a pension exhibit a higher median financial literacy score and a slightly more compressed interquartile range compared to those without a pension or who preferred not to answer. This indicates that pension participants tend to be not only more knowledgeable on average, but also more homogeneous in their financial capability.

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[16] Bucher-Koenen and Lusardi (2011), *Financial Literacy and Retirement Planning in Germany*; Van Rooij, Lusardi, and Alessie (2011), *Financial Literacy and Retirement Preparation in the Netherlands.*

Respondents who do not own a pension fund score lower on average, and the variability within this group is higher. The lowest scores and widest spread are observed among those who chose not to disclose their pension status. This may reflect a combination of limited financial awareness and reduced engagement with long-term planning products.

These patterns support the hypothesis that financial literacy is positively associated with pension participation, in line with prior findings in the literature .[17]

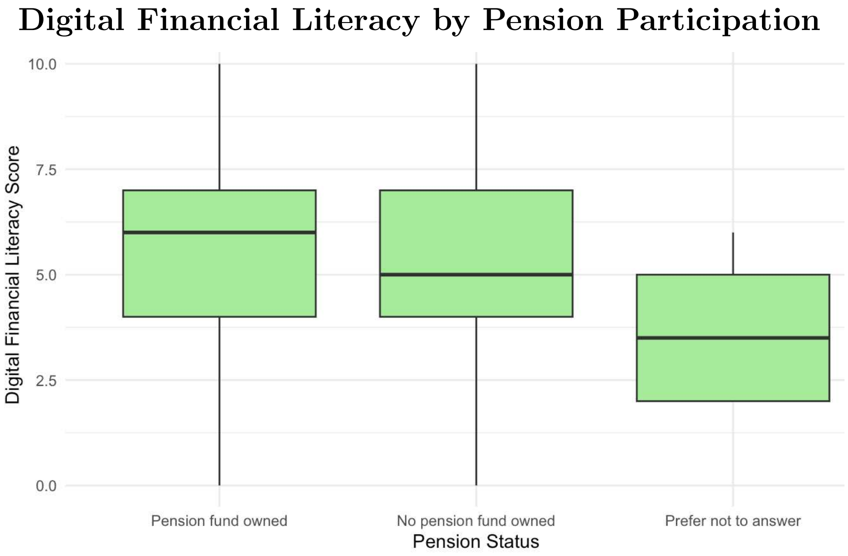

Figure 6.4: Boxplot of digital financial literacy scores by supplementary pension participation status.

Figure 6.4 shows the distribution of digital financial literacy (DFL) scores by pension status. As with traditional financial literacy, pension holders display a higher median digital score and a more concentrated distribution. This suggests that individuals who are better equipped to navigate digital financial environments are also more likely to participate in long-term retirement savings schemes.

Those without a pension fund show lower digital literacy on average, and the group that preferred not to respond once again exhibits the lowest median and the greatest variability in scores. This may point to broader disengagement from financial decision-making, particularly in digital contexts.

The results highlight that digital competence is increasingly important for effective retirement planning. Given that supplementary pension products are often managed or accessed online, digital financial literacy may represent a crucial enabler of long-term financial inclusion in the evolving Italian pension landscape.

6.2.1 Determinants of Saving Decisions

To evaluate whether financial literacy and digital financial literacy predict participation in voluntary pension schemes, we estimate two logistic regression models. In both models, the dependent variable is a binary indicator equal to 1 if the respondent owns a supplementary pension fund and 0 otherwise. The first model includes the traditional financial literacy score as the sole predictor, while the second uses digital financial literacy.

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[17] Fornero and Monticone (2011); Jappelli and Padula (2013).

Model 1: Financial Literacy. The estimated coefficient on the financial literacy score is positive and statistically significant at the 1% level. Specifically, the coefficient of 0.273 (SE = 0.043) indicates that each additional point in the financial literacy score is associated with a 27.3% increase in the log-odds of owning a pension fund. This translates to an odds ratio of $\exp(0.273) \approx 1.31$, meaning the odds of pension participation rise by 31% for each additional point on the 0–20 scale. The intercept is negative and significant, consistent with the low baseline probability of pension ownership among individuals with minimal financial literacy.

Model 2: Digital Financial Literacy. The second model reveals a similarly strong relationship between digital financial literacy and pension participation. The coefficient on the DFL score is 0.296 (SE = 0.052), statistically significant at the 1% level. This implies that each additional point on the digital literacy scale (0–10) increases the log-odds of owning a pension product by nearly 30%. The corresponding odds ratio, $\exp(0.296) \approx 1.34$, confirms that digital literacy has a sizable impact on long-term financial planning behavior.

FL and DFL as Predictors of Pension Ownership

Table 6.2: Pension Ownership Models

	Dependent variable:	
	has_pension	
	FL	DFL
	(1)	(2)
Financial Literacy	0.279^{***}	
	(0.026)	
Digital Financial Literacy		0.224^{***}
		(0.031)
Constant	-6.214^{***}	-4.007^{***}
	(0.333)	(0.182)
Observations	4,862	4,862
Log Likelihood	−933.550	−975.542
Akaike Inf. Crit.	1,871.100	1,955.085
Note:	*p<0.1; **p<0.05; ***p<0.01	

Interpretation and Implications Both models show good statistical fit. The log-likelihood is higher (less negative) and the Akaike Information Criterion (AIC) is lower for the financial literacy model, indicating a marginally better overall model fit. However, both variables are strong and independent predictors of pension participation.

These results underscore the central role of financial capability in preparing for retirement. Individuals with higher levels of both traditional and digital financial literacy are significantly more likely to invest in supplementary pension products. The strength and significance of both coefficients suggest that financial knowledge not only enables better understanding of pension instruments, but may also reflect greater awareness of the limitations of public pensions and the need for individual financial responsibility.

In particular, the slightly stronger effect of digital financial literacy is noteworthy. As pension management increasingly shifts to online platforms and digital interfaces, digital competence is becoming a prerequisite for informed participation. This reinforces the importance of digital inclusion initiatives and targeted financial education to improve retirement outcomes, particularly among digitally disadvantaged groups. These findings align with previous international research .[18]

6.3 Portfolio Choices

Participation in capital markets is an important indicator of long-term financial engagement and a key contributor to household wealth accumulation. Owning investment products whether directly (e.g., individual stocks) or indirectly (e.g., mutual funds) can help households diversify risk, benefit from compound returns, and plan for future financial needs. Yet despite these potential benefits, stock market participation remains low in many countries, particularly in Southern Europe. Italy, in particular, continues to display one of the lowest equity participation rates among advanced economies .[19]

In this chapter, we examine the relationship between financial literacy and participation in *traditional investment markets*, explicitly excluding newer or alternative financial products such as *cryptocurrencies*, as well as non-market-based financial vehicles such as *voluntary pensions* and *non-mandatory insurance*. While all of these are part of the broader household financial portfolio, we isolate conventional market engagement to better align with historical financial literacy literature and to focus on more established instruments. A dedicated chapter on cryptocurrency ownership follows this section and will explore that distinct form of investment behavior in detail.

In this analysis, we define an individual as a market participant if they report owning at least one of the following traditional investment products:

- **Investment funds**, including mutual funds and exchange-traded funds (ETFs), which offer diversified exposure to a mix of equities or bonds and are widely considered the most common form of indirect stock market engagement;
- **Individual stocks**, representing direct equity ownership in public companies typically associated with higher financial literacy, confidence, and risk tolerance;
- **Bonds**, which we include because of their role in capital markets and their function as traded instruments, even though they are not equity assets per se;
- **Cooperative loans**, investment-style financial products tied to local or mutualist institutions, which may serve as market substitutes, especially in the Italian context;
- **Sustainable or ESG investments**, which include market-based products that align with environmental, social, and governance criteria and have grown in popularity, particularly among younger or socially conscious investors.

This definition follows a *broad investment participation* framework used in prior studies such as Van Rooij et al. (2011) and Guiso et al. (2002) that captures both direct and indirect forms of market engagement .[20] It reflects how most Italian households access financial markets: not through complex equity portfolios, but via professionally managed funds, bank-distributed bond products, or socially oriented investment vehicles.

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[18] Bucher-Koenen and Lusardi (2011); Van Rooij, Lusardi, and Alessie (2011); Jappelli and Padula (2013).

[19] Guiso, Haliassos, and Jappelli (2002); Jappelli and Padula (2015).

[20] Van Rooij, Lusardi, and Alessie (2011); Guiso, Haliassos, and Jappelli (2002).

Although investment products are readily available in Italy, only a small share of the population reports owning them. According to SHARE and SHIW data, fewer than 15% of Italian households hold stocks or mutual funds, and even broader risky asset ownership including bonds or ESG products remains low by international standards .[21] This low rate of market engagement has been attributed to a combination of institutional factors, cultural preferences for guaranteed returns, and low levels of financial capability.

Italians tend to invest a relatively large proportion of their wealth in these products when they do participate, suggesting that financial market exposure is concentrated among a small group of financially knowledgeable individuals rather than broadly distributed .

Financial literacy has been consistently shown to be a strong predictor of investment behavior. Van Rooij, Lusardi, and Alessie (2011) find that individuals with high financial literacy are significantly more likely to invest in the stock market, even after accounting for income, education, and wealth. In Italy, Jappelli and Padula (2015) report similar findings using the SHIW dataset, further noting that the effect of financial literacy is stronger in countries with less comprehensive pension systems though this crowding-out effect is partially offset by recent pension reforms.

Moreover, financial literacy influences not only whether individuals participate in markets, but also how they evaluate risk, choose between products, and plan for long-term financial goals .[22] Gender differences are also well-documented: women are significantly less likely to invest in equities, and this gap is often linked to differences in risk aversion, confidence, and financial education .

Digital financial literacy is now emerging as an equally important factor in investment behavior. As investment platforms migrate to digital channels including trading apps, robo-advisors, and mobile-based brokerage services digital competence becomes a key determinant of accessibility. Balutel and Engert (2023) show that digital financial literacy significantly predicts ownership of both traditional and crypto-assets, highlighting the importance of digital skills in modern financial ecosystems .[23]

This chapter investigates the extent to which financial and digital financial literacy are associated with traditional investment ownership in Italy. We begin by presenting descriptive statistics and graphical evidence on literacy differences between investors and non-investors. We then estimate logistic regression models to quantify the predictive power of financial capability on participation in traditional investment products. A separate chapter follows, focusing specifically on cryptocurrency ownership a distinct and emerging domain of household investment behavior.

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[21] Jappelli and Padula (2015).

[22] Lusardi and Mitchell (2011); Almenberg and Dreber (2015).

[23] Balutel and Engert (2023), *Crypto and financial literacy: Evidence from Canada.*

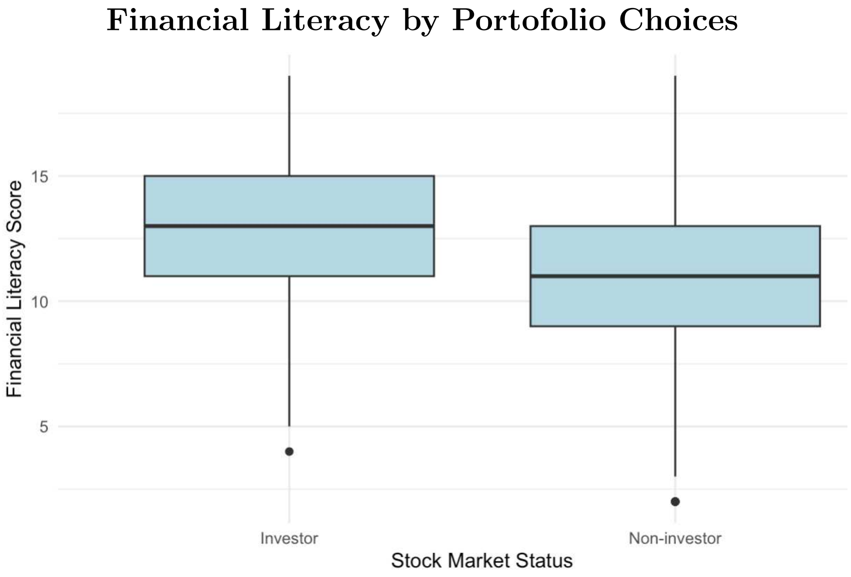

Figure 6.5: Boxplot of financial literacy scores by stock market participation.

Figure 6.5 displays the distribution of financial literacy scores across individuals classified as stock market participants versus non-participants. Investors show a visibly higher median financial literacy score, and their interquartile range lies entirely above that of non-investors. The overall distribution is more compressed among investors, suggesting not only a higher average capability but also a more consistent level of financial knowledge among those who engage in market-based financial products.

In contrast, non-investors show a broader spread and lower median, indicating more heterogeneity and lower overall financial understanding. This pattern aligns with existing literature, which consistently finds that individuals with higher financial literacy are more likely to invest in stocks and mutual funds .[24] The findings underscore the role of financial education as a key enabler of informed investment behavior and long-term financial planning.

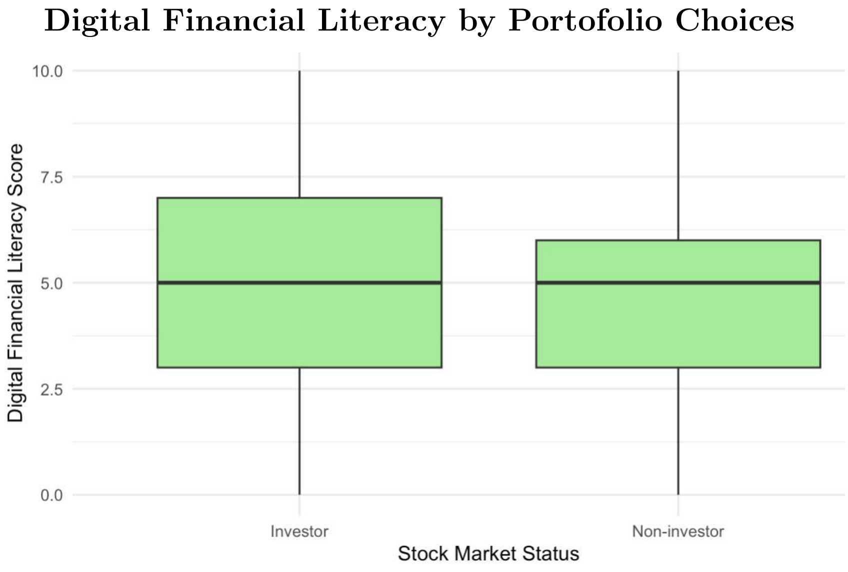

Figure 6.6: Boxplot of digital financial literacy scores by stock market participation.

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[24] Van Rooij, Lusardi, and Alessie (2011); Jappelli and Padula (2015).

Figure 6.6 presents the distribution of digital financial literacy (DFL) scores for the same two groups. Once again, investors display a higher median DFL score and a distribution shifted upward compared to non-investors. This suggests that the ability to navigate digital financial platforms may be increasingly important for market participation, especially as trading and investment services are now primarily offered online.

Non-investors show a slightly flatter distribution, with a wider interquartile range and more concentration at lower DFL levels. This could reflect digital exclusion or a lack of confidence in using online investment tools. These differences are consistent with recent findings by Balutel and Engert (2023), who highlight digital financial literacy as a growing predictor of participation in both traditional and emerging financial markets .[25]

Overall, both plots confirm that financial and digital financial literacy are strongly associated with engagement in stock and market-based products. This supports the hypothesis that literacy in both domains facilitates informed financial decision-making and lowers the cognitive and technological barriers to investment.

6.3.1 Determinants of Portfolio Choices

To further investigate the relationship between financial capability and market engagement, we estimate two logistic regression models in which the dependent variable is a binary indicator equal to 1 if the individual reports owning at least one traditional investment product and 0 otherwise. This definition of market participation includes affirmative responses to any of the following financial instruments: *investment funds*, *individual stocks*, *bonds*, *cooperative loans*, or *sustainable (ESG) investment products*. These represent standard, regulated investment categories accessible through banks, asset managers, or licensed brokers. Importantly, this definition excludes non-traditional or emerging assets such as *cryptocurrencies*, as well as other financial holdings such as *voluntary pension plans* or *non-mandatory insurance policies*. The intention is to isolate participation in the conventional financial market from alternative financial products and insurance-based savings mechanisms.

Model 1: Financial Literacy. The first regression model uses the total financial literacy score (ranging from 0 to 20) as the sole explanatory variable. The estimated coefficient on financial literacy is 0.316 (standard error = 0.021), and is statistically significant at the 1% level ($p < 0.001$). This result indicates that, holding all else constant, a one-point increase in the financial literacy score increases the log-odds of owning at least one traditional investment product by approximately 0.316.

Exponentiating the coefficient yields an odds ratio of $\exp(0.316) \approx 1.37$, meaning that for each additional point in the financial literacy score, the odds of participating in the traditional investment market increase by 37%. Given that the financial literacy score ranges from 0 to 20, this implies that the difference in odds between someone at the bottom of the distribution (e.g., score = 5) and someone near the top (e.g., score = 15) is substantial approximately 13 times higher odds of holding a traditional investment.

The intercept in this model is -6.079 (SE = 0.272), suggesting that individuals with a financial literacy score of zero have an extremely low baseline probability of holding any investment.

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[25] Balutel and Engert (2023), *Crypto and financial literacy: Evidence from Canada.*

Model 2: Digital Financial Literacy. The second model replaces the explanatory variable with the digital financial literacy (DFL) score, which ranges from 0 to 10. The estimated coefficient is 0.290 (SE = 0.042), also significant at the 1% level. This translates to an odds ratio of $\exp(0.290) \approx 1.34$, indicating that each one-point increase in the DFL score is associated with a 34% increase in the odds of owning at least one traditional investment product.

This result underscores the increasing importance of digital capability in accessing investment opportunities. As financial services including trading platforms, robo-advisors, and investment apps move online, digital financial competence has become a critical enabler of market participation.

FL and DFL as Predictors of Portfolio Choices

Table 6.3: Portfolio Choices Models

	Dependent variable:	
	has_traditional_investments	
	FL	DFL
	(1)	(2)
Financial Literacy	0.316^{***}	
	(0.021)	
Digital Financial Literacy		0.290^{***}
		(0.042)
Constant	-6.079^{***}	-4.605^{***}
	(0.272)	(0.266)
Observations	4,862	4,862
Log Likelihood	−1,339.343	−1,372.452
Akaike Inf. Crit.	2,682.685	2,748.903
Note:	*p<0.1; **p<0.05; ***p<0.01	

Interpretation and Implications These findings strongly support the hypothesis that both financial literacy and digital financial literacy are key predictors of investment behavior. Individuals with higher literacy scores both traditional and digital are significantly more likely to hold at least one conventional market-based financial product. Notably, these results are not driven by ownership of more passive financial products like insurance or pensions, nor by speculative digital assets like cryptocurrencies. Instead, they reflect engagement with mainstream capital markets.

The magnitude of the effects suggests that differences in financial capability are not only statistically significant but also substantively meaningful. This is particularly relevant in the Italian context, where overall rates of stock market participation remain low, and literacy gaps are wide across gender, education, and regional lines. Enhancing both traditional and digital financial literacy may thus serve as a powerful policy lever to promote more inclusive access to financial markets and reduce wealth inequality over time.

These results align with prior evidence from Van Rooij et al. (2011), who find that financial literacy is a major determinant of stockholding across Europe, and with more recent work highlighting the role of digital competence in facilitating investment engagement .[26]

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[26] Van Rooij, Lusardi, and Alessie (2011); Balutel and Engert (2023).

Robustness Check: Diversity of Portoflio Assets

While the binary indicator for investment participation provides a useful first look at market engagement, it may be overly reductive given the diversity of traditional investment products. Specifically, classifying all individuals who hold at least one investment the same way overlooks important variation in portfolio variety. To address this, we estimate an alternative model using the total number of traditional investment products held by each individual as a continuous dependent variable. This count variable ranges from 0 to 5 and reflects whether the respondent owns any combination of the following: investment funds, individual stocks, bonds, cooperative loans, and sustainable (ESG) investments.

Table 6.4: OLS Regressions: Financial Literacy and Number of Traditional Investments Held

	Dependent variable:	
	traditional_investment_holdings	
	FL	DFL
	(1)	(2)
Financial Literacy	0.037^{***}	
	(0.002)	
Digital Financial Literacy		0.026^{***}
		(0.003)
Constant	-0.272^{***}	0.013
	(0.024)	(0.015)
Observations	4,862	4,862
R^2	0.058	0.015
Adjusted R^2	0.058	0.015
Residual Std. Error (df = 4860)	0.462	0.472
F Statistic (df = 1; 4860)	299.1^{***}	73.28^{***}
Note:	*p<0.1; **p<0.05; ***p<0.01	

The results in Table 6.4 provide additional insight into the relationship between financial capability and investment behavior. Rather than focusing solely on whether an individual owns at least one investment product, this model investigates how the number of traditional investment types held varies with financial and digital financial literacy. The dependent variable ranges from 0 to 5, reflecting the total count of owned products among investment funds, stocks, bonds, cooperative loans, and sustainable (ESG) portfolio choices.

Model 1 shows that financial literacy is strongly associated with broader market engagement. The coefficient on financial literacy is 0.037 (p ¡ 0.001), indicating that for each additional point on the 0–20 financial literacy scale, the expected number of traditional investment products held increases by approximately 0.037. While the marginal increase may seem small, the cumulative effect is notable: an individual scoring 15 points higher on the financial literacy scale would be expected to hold roughly 0.56 more investment products.
This reinforces the idea that financially literate individuals not only enter the market, but also diversify more extensively across product types.

Model 2, which uses digital financial literacy as the sole predictor, reveals a positive and statistically significant coefficient of 0.026 (p ¡ 0.001). This suggests that digital competence also plays a meaningful role in portfolio diversification. Although the effect size is smaller than that of traditional financial literacy, it remains substantial given the 10-point range of the digital literacy score.

These results confirm and extend the findings from the binary models: financial and digital literacy are not only associated with whether individuals invest, but also with how broadly they invest. In the context of Italy where stock market participation is relatively low these findings imply that improving financial capability could promote not just entry into financial markets, but also more sophisticated investment behavior. This may have important implications for wealth accumulation and resilience, particularly as access to a diverse investment portfolio becomes increasingly important in a low-yield environment.

6.4 Cryptocurrency Ownership

Cryptocurrencies have emerged as one of the most innovative and controversial developments in the global financial ecosystem over the last 15 years. Initially born as an experimental digital cash system, they have since evolved into a speculative investment vehicle, a symbol of decentralisation, and, in some regions, a tool for financial inclusion. In this chapter, we analyse the factors associated with cryptocurrency ownership, with a special focus on the role of financial literacy and digital financial literacy two capabilities that appear increasingly important for navigating the opportunities and risks posed by cryptoassets.

While previous sections examined more traditional financial instruments (e.g., pension funds, stocks, bonds), the inclusion of cryptocurrency represents a novel contribution of this thesis. We treat crypto ownership not as a substitute for other forms of financial participation, but as a unique and high-risk decision-making domain where confidence, curiosity, and digital competence may outweigh conventional knowledge.

A *cryptocurrency* is a digital or virtual form of money that uses cryptographic techniques to secure transactions, regulate supply, and verify transfers without the need for a central authority. Most cryptocurrencies are built on a **blockchain** a distributed, tamper-resistant ledger that records every transaction in time-stamped blocks chained to one another using hash functions.

The pioneering cryptocurrency is **Bitcoin**, launched in 2009 by the pseudonymous *Satoshi Nakamoto*. The core innovation behind Bitcoin is the solution to the ”double-spending problem” in peer-to-peer networks, enabled through a consensus mechanism known as **Proof-of-Work (PoW)**. Under this protocol, nodes (known as *miners*) compete to solve complex cryptographic puzzles to validate transactions and append them to the blockchain. The first to solve the puzzle receives newly minted bitcoins as a reward a process known as *mining.*

Bitcoin is not the only cryptocurrency. Other prominent examples include:

- **Ethereum (ETH)** introduces programmable smart contracts and decentralised applications (dApps).
- **Litecoin (LTC)** a faster, lighter version of Bitcoin.
- **Ripple (XRP)** designed for fast cross-border payments and institutional use.
- **Tether (USDT)** and other *stablecoins* pegged to fiat currencies and used to mitigate volatility.

The cryptocurrency era officially began on **January 3, 2009**, when the first Bitcoin block called the *genesis block* was mined. The network's first widely acknowledged economic transaction took place on **May 22, 2010**, when 10,000 BTC were exchanged for two pizzas. This event is now celebrated as *Bitcoin Pizza Day*, marking the moment when Bitcoin gained a tangible market value.

In the early years, adoption was limited to enthusiasts, developers, and libertarians interested in decentralisation. As prices soared, especially during the 2017 and 2021 bull runs, cryptocurrencies attracted a wider, more speculative user base. El Salvador made history in 2021 by adopting Bitcoin as legal tender, though empirical evidence indicates that actual usage remained limited despite government incentives [27].

Globally, cryptocurrency adoption varies by use case. In high-income countries, cryptocurrencies are primarily speculative assets. In low-income and high-inflation environments, they may serve as an alternative to weak local currencies or as tools for financial inclusion .

A blockchain consists of a public ledger where transactions are grouped into blocks. Each block contains a cryptographic hash of the previous block, ensuring chronological integrity. In Proof-of-Work systems, miners expend computational resources to solve a hash puzzle, ensuring that adding a block requires demonstrable effort.

This mechanism is what secures the network against fraud. Changing a single transaction would require redoing all subsequent work on the blockchain, which becomes practically infeasible as the chain grows. Although PoW is highly secure, it is energy-intensive. Alternatives such as **Proof-of-Stake (PoS)** used by Ethereum since 2022 offer energy efficiency by selecting validators based on coin ownership rather than computation.

Cryptocurrency ownership in Italy remains relatively limited compared to countries like the United States, Canada, or South Korea, but interest is growing particularly among younger, tech-savvy individuals. Cascavilla (2024) shows that perception of Bitcoin in Italy varies according to levels of financial literacy: less financially literate individuals are more likely to view Bitcoin as a currency, whereas those with higher literacy levels tend to regard it as a speculative asset:contentReference[oaicite:0]index=0.

Italy's regulatory framework for cryptocurrencies is still evolving. The country aligns with EU-level regulations under the Markets in Crypto-Assets (MiCA) initiative, aiming to ensure investor protection and anti-money laundering compliance. Despite this, public understanding of how cryptocurrencies work remains limited, and formal education on the topic is virtually absent from mainstream curricula.

In practice, Italian investors in crypto are largely self-directed. According to Cascavilla, a lack of trust in traditional banks also appears to influence some young Italians' interest in Bitcoin as a decentralised alternative. This perception links financial literacy, institutional trust, and technological adoption in a particularly pronounced way in Italy.

A growing body of literature suggests that crypto investment requires a distinct set of knowledge sometimes referred to as *crypto literacy.* Balutel and Engert (2023) report that among Canadian Bitcoin holders, 40% had low financial literacy and 32% had low crypto literacy . In contrast, only a minority demonstrated strong understanding of key concepts like seed phrases, mining, or blockchain validation.

Gender differences also persist. Bannier et al. (2019) estimate that as much as 40% of the gender gap in Bitcoin ownership could be attributed to differences in actual and perceived financial literacy .

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[27] Alvarez et al. (2023), *Are cryptocurrencies currencies? Bitcoin as legal tender in El Salvador.*

This chapter builds on the international and Italian literature by exploring how both financial and digital financial literacy influence cryptocurrency ownership in Italy. Unlike previous sections of this thesis, the focus here is on a high-risk, high-variance financial decision often made by individuals with limited experience or external guidance.

Given the novelty and decentralised nature of cryptocurrencies, we hypothesise that digital financial literacy will play an especially strong role. In the next sections, we present descriptive statistics on crypto ownership, followed by regression models that isolate the influence of financial capability from demographic and economic confounders.

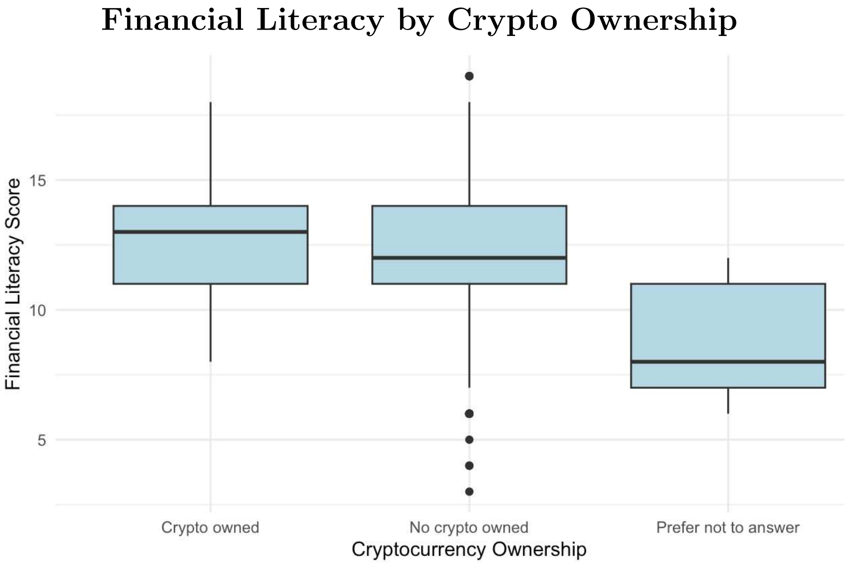


Figure 6.7: Financial literacy scores by cryptocurrency ownership status.

The boxplot in Figure 6.7 compares the distribution of financial literacy scores across three groups: individuals who own cryptocurrency, those who do not, and those who preferred not to answer. Respondents who own cryptocurrency display slightly higher median financial literacy scores and a narrower interquartile range compared to non-owners. This suggests a modest association between higher financial literacy and the likelihood of crypto ownership. Interestingly, individuals who selected "Prefer not to answer" exhibit both lower median scores and greater dispersion, possibly indicating uncertainty or lower engagement with financial topics more broadly.

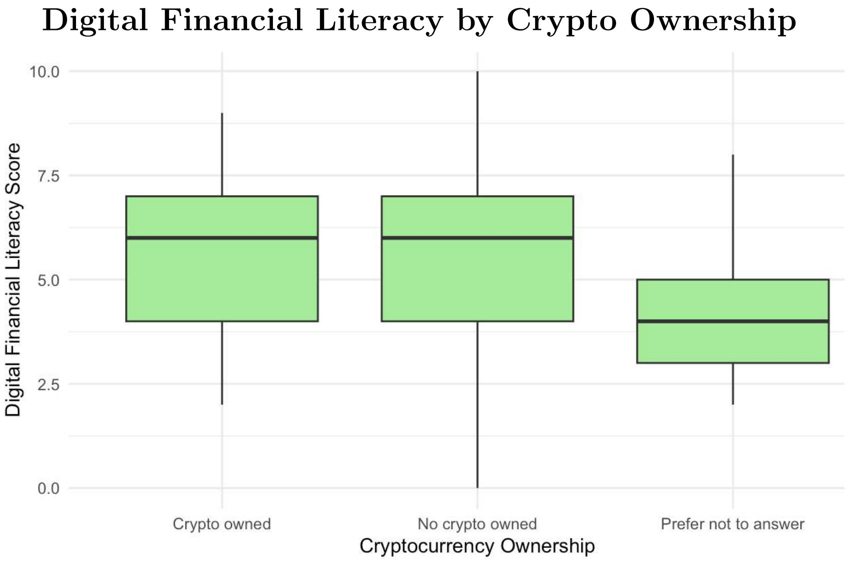


Figure 6.8: Digital financial literacy scores by cryptocurrency ownership status.

Figure 6.8 illustrates the relationship between digital financial literacy and cryptocurrency ownership. Here, the differences are even more pronounced than in the financial literacy distribution. Individuals who own cryptocurrency consistently report higher digital literacy scores, with a clear elevation in both the median and upper quartile. This pattern reinforces the hypothesis that digital literacy plays a particularly important role in crypto adoption, given that engagement with these assets requires a degree of comfort with digital wallets, online trading platforms, and self-custody security protocols. Once again, the “Prefer not to answer” group appears less digitally literate on average, suggesting a potential knowledge or confidence gap.

6.4.1 Determinants of Crypto Ownership

Th regressions presents the results of two logistic regressions that estimate the likelihood of owning cryptocurrency as a function of financial literacy and digital financial literacy, respectively. The dependent variable is a binary indicator equal to 1 if the respondent reported owning cryptoassets (specifically, those who answered ”Yes” to question `qp2_16`), and 0 otherwise.

Model 1: Financial Literacy includes only the financial literacy score as a predictor. The estimated coefficient is 0.235 and is statistically significant at the 1% level (p ¡ 0.001). In a logistic regression, this coefficient represents the change in the log-odds of owning cryptocurrency for a one-unit increase in the financial literacy score. To provide a more intuitive interpretation, we can exponentiate the coefficient: $\exp(0.235) \approx 1.265$, which implies that for each additional point on the 0–20 financial literacy scale, the odds of owning crypto increase by approximately 26.5%. This result is consistent with previous research suggesting that individuals with higher financial knowledge are more likely to engage in complex or non-traditional financial behaviors such as crypto investing .

Model 2: Digital Financial Literacy uses digital financial literacy as the sole explanatory variable. The estimated coefficient is 0.286, also highly significant (p ¡ 0.001). This indicates an even stronger marginal effect: $\exp(0.286) \approx 1.331$, suggesting that a one-point increase in the 0–10 digital financial literacy scale increases the odds of cryptocurrency ownership by approximately 33.1%. This aligns with the hypothesis that digital financial literacy is particularly relevant for crypto adoption, as engagement with cryptocurrencies often requires navigating decentralised applications, managing private keys, using QR codes, and evaluating the security of online wallets and exchanges .

FL and DFL as Predictors of Cryptocurrency Ownership

Table 6.5: Crypto Ownership Models

	Dependent variable:	
	has_crypto	
	FL	DFL
	(1)	(2)
Financial Literacy	0.235***	
	(0.061)	
Digital Financial Literacy		0.286***
		(0.080)
Constant	−7.600***	−6.296***
	(0.790)	(0.490)
Observations	4,862	4,862
Log Likelihood	−218.789	−220.146
Akaike Inf. Crit.	441.579	444.291
Note:	*p<0.1; **p<0.05; ***p<0.01	

Interpretation and Implications Both models produce negative and statistically significant intercepts (−7.600 for Model 1 and −6.296 for Model 2), reflecting the low baseline probability of owning cryptocurrency among individuals with low literacy scores. The AIC values (441.579 and 444.291) are similar, though slightly lower for the financial literacy model. This may indicate a marginally better in-sample fit, though the explanatory power of both models is relatively limited, as expected in binary outcome models of rare behaviors.

These results confirm that both financial and digital financial literacy are significant and independent predictors of cryptocurrency ownership. However, the magnitude of the effect for digital literacy is slightly larger, underscoring the importance of digital competencies in navigating this emerging financial domain. This suggests that enhancing digital literacy may be particularly effective in supporting safer and more informed crypto participation.

Chapter 7

Clustering Analysis: Identifying Investor Typologies

In addition to regression-based approaches, this chapter adopts an unsupervised machine learning method, clustering analysis, to explore heterogeneity in financial behavior among Italian adults. While previous chapters focused on how specific factors such as financial literacy influence individual financial decisions, this section aims to discover already existing profiles of financial behavior by grouping individuals based on similarities in investment choices, financial literacy and digital financial literacy levels and finally risk preferences.

The clustering approach is particularly useful for identifying and highlighting underlying behavioral prototypes without having prior assumptions about group membership. This is especially relevant in the context of household finance, where people often engage in various financial activities shaped by a combination of cognitive, behavioral, and socioeconomic factors, all captured by our main variables. By applying a clustering algorithm to a set of investment-related and behavioral variables, we can identify specific typologies of investors that may belong to certain groups that will be defined later.

The analysis is carried out in several steps. First, we select a subset of variables representing ownership of financial products (including traditional portfolio choices, insurance, pension funds, and cryptocurrencies), risk attitudes, and financial and digital financial literacy scores. Second, we apply k-means clustering, a distance-based partitioning algorithm, after standardizing all input variables by scaling them to ensure comparability, since the range of admissible values differs from variable to variable. Third, we determine the optimal number of clusters (investor groups) combining the results of both the elbow method and the silhouette analysis. Finally, we interpret the resulting clusters by observing their average characteristics and link them to the demographic dimensions we dispose of, such as education, income, and geographical area.

The results reveal three distinct groups that differ not only in their level of financial engagement, but also in their literacy scores and risk tolerance. These profiles provide a richer understanding of the Italian population's financial landscape, and serve as a foundation for discussing differentiated policy strategies aimed at improving financial inclusion and education.

7.1 Clustering: Concept and Motivation

Clustering is a technique from the field of unsupervised machine learning that aims to partition a dataset into distinct groups, or *clusters*, such that individuals within each cluster are more similar to each other than to those in other clusters. Unlike supervised learning, clustering does not rely on predefined labels or outcomes and therefore individuals are not to be divided up into predefined groups. Instead, it aims to uncover hidden structures or natural groupings based on patterns observed in the data, thus the name "unsupervised".

In the context of household finance, clustering provides an effective method to move beyond binary distinctions, such as investor versus non-investor, like mny of our variables, and instead discover articulate behavioral profiles. For example, two individuals may both invest in financial products, but one may focus on long-term pension schemes while another engages in high-risk digital assets like cryptocurrencies. Similarly, some individuals may avoid investments altogether due to risk aversion, difficulties with digital tools, or low financial confidence. Clustering allows us to detect such multidimensional patterns without imposing arbitrary classifications.

In this chapter, clustering is used to identify investor typologies based on multiple variables: ownership of various financial products (e.g., investment funds, pension fund, insurance, cryptocurrencies), self-reported risk attitudes, and indices of both financial literacy and digital financial literacy. The goal is to form cleanly separate and interpretable groups that capture the diversity of financial involvement in the Italian adult population.

This type of segmentation has practical implications for the design of financial education programs, product targeting, and policy interventions. For instance, it allows us to assess whether the financially illiterate are also digitally illiterate, or whether certain clusters represent younger, more technologically confident individuals. As we will show, the clusters obtained are not only statistically distinct but also sociologically meaningful.

7.1.1 Methodology: K-Means Clustering and Cluster Selection

To extract underlying investor typologies from the data, we employ the k-means clustering algorithm, one of the most widely used partitioning methods in unsupervised learning. The main objective of k-means is to partition a set of n observations into k clusters such that each observation belongs to the cluster with the nearest *centroid* the mean of the observations in that cluster. The result is a division of the dataset into k mutually exclusive groups that minimize within-cluster variance while maximizing between-cluster separation. In simpler words, the individuals within a group will be very similar to each other and very different from the individuals in the other groups.

The k-means algorithm operates iteratively and involves the following steps:

1. **Initialization**: k initial centroids are randomly selected from the dataset. These are simply casually chosen individuals.

2. **Assignment step**: Each observation is assigned to the cluster with the closest centroid, typically using the Euclidean distance metric. This measure is the shortest straight-line distance between two points in a multi-dimensional space. In a cartesian space, the euclidean distance is simply the length of the line connecting two dots with x and y coordinates.

3. **Update step**: The centroid of each cluster is recalculated as the mean of all observations assigned to that cluster. So the centroid lable might be reassigned to another individual who is the most similar to all the other on average.

4. **Repeat**: Steps 2 and 3 are repeated until convergence, that is until cluster assignments no longer change and the centroids remain the same individuals or the decrease in within-cluster sum of squares (WCSS) becomes negligible.

Because the k-means algorithm is sensitive to the initial placement of cluster centroids, different random starting points can lead to different clustering outcomes. To address this issue and improve the robustness of the results, we follow a common best practice by specifying multiple random initializations. Specifically, we set `nstart = 25`, meaning the algorithm runs 25 times with different randomly chosen initial centroids. Among these runs, the solution that minimizes the total within-cluster variance, also known as the total within-cluster sum of squares, is selected as the final result. In simple terms, this approach helps avoid suboptimal solutions caused by unlucky starting points and ensures that we find a clustering that groups the data as tightly as possible.

Because k-means clustering is distance-based, the scale of the input variables can heavily influence the result and definitely has to be accounted for. For this reason, all variables were standardized using z-scores (subtracting the mean and dividing by the standard deviation). This ensures that variables with larger numerical ranges (e.g., financial literacy scores ranging from 0 to 20) do not dominate those with smaller ranges (e.g., binary indicators of investment ownership or risk aversion ranging from 1 to 4).

A key decision in k-means is selecting the appropriate number of clusters k. To do this, we use two tools: the *elbow method* and the *silhouette method*.

- The **elbow method** evaluates the total within-cluster sum of squares (WCSS) as a function of k. As k increases, WCSS naturally decreases since more centroids better fit the data. If we allow the algorithm to create countless categories, we will end up with extremely niche groups formed by extremely similar individuals. However, the marginal gain diminishes at a certain point, creating a bend or "elbow" in the plot. This elbow represents an optimal trade-off between model fit and interpretability.

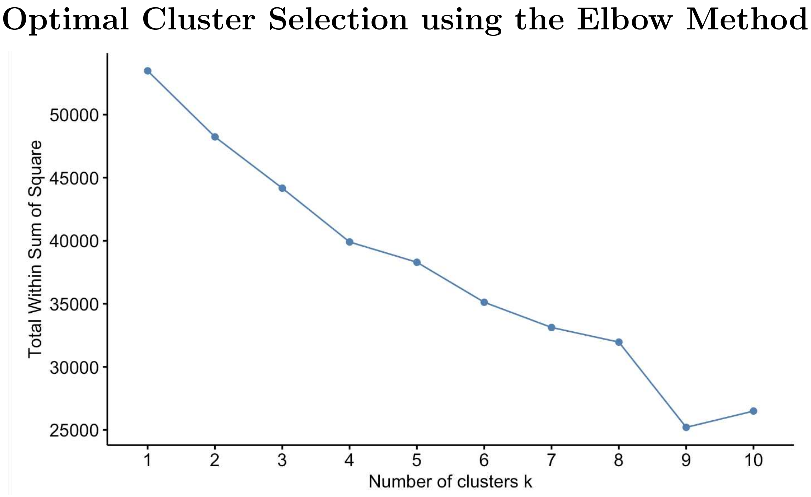


Figure 7.1: Elbow method: within-cluster sum of squares (WCSS) as a function of the number of clusters k.

- The **silhouette method** assesses the quality of clustering by measuring how well each observation fits within its assigned cluster compared to other clusters. The silhouette score ranges from -1 to $+1$, where higher values indicate better separation between groups and more cohesion within groups. A high average silhouette width suggests that the chosen k results in well-formed clusters.

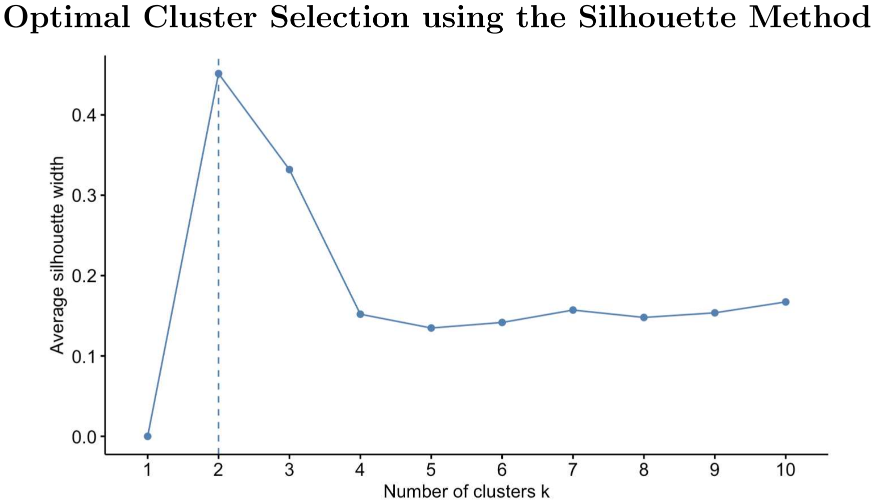


Figure 7.2: Silhouette method: average silhouette width by number of clusters, with the highest score at $k = 2$.

In our analysis, both diagnostics were computed for k ranging from 1 to 10. Although the elbow plot does not display a clear inflection point (the "elbow"), the decrease in within-cluster variance remains relatively consistent between $k = 2$ and $k = 4$, suggesting no dominant optimal choice based on this criterion alone. Meanwhile, the silhouette method identified $k = 2$ as the statistically best-separated solution. To balance these considerations, we selected $k = 3$ as a compromise that maintains acceptable cluster separation while offering greater behavioral granularity. This choice enables a more nuanced segmentation of the population into distinct investor typologies rather than just dividing them into overly broad or simplistic categories. We therefore proceed with $k = 3$ as the optimal number of clusters for our segmentation. The following sections present the composition, interpretation, and demographic analysis of the three clusters identified. These investor typologies reflect diverse patterns of financial engagement and literacy, and offer valuable insight into the heterogeneity of financial behavior in Italy.

7.2 Cluster Visualization: Principal Component Analysis

Each point in the following visualizations represents a single respondent in the dataset, positioned according to their overall financial profile. These profiles are defined by the beforehand mentioned and analyzed variables. Individuals with similar profiles, e.g., high financial literacy and broad investment portfolios, appear closer together in space, while those with contrasting behaviors are positioned farther apart. The coloring of the points reflects their cluster assignment as determined by the k-means algorithm, which grouped respondents based on multidimensional similarity across all features.

To better understand and visualize how individuals are grouped into clusters, we use a technique called *Principal Component Analysis* (PCA). This method simplifies complex data by reducing its dimensions. It takes a dataset with many variables and condenses it into just a few new variables, while still keeping as much important information as possible. In technical terms, PCA transforms the original variables into a new set of uncorrelated axes, known as principal components. These components represent the directions in which the data varies the most. The first principal component (PC1) captures the largest amount of variation across individuals, the second component (PC2) captures the next most variation, and so on. By plotting the data along the first few principal components, we can visualize patterns and relationships in a two- or three-dimensional space, making the abstract concept of clusters more concrete and easier to interpret and more importantly visualize it.

By projecting the high-dimensional standardized dataset into a lower-dimensional space (typically two or three dimensions), PCA enables us to plot and visually inspect the structure of the clusters while retaining as much of the data's variation as possible.

2D PCA Projection.

Figure 7.3 shows a two-dimensional PCA projection of the clustered data. Each point represents an individual, colored according to its assigned cluster. The horizontal and vertical axes correspond to the first and second principal components, respectively, which together explain a significant proportion of the variance in the data.

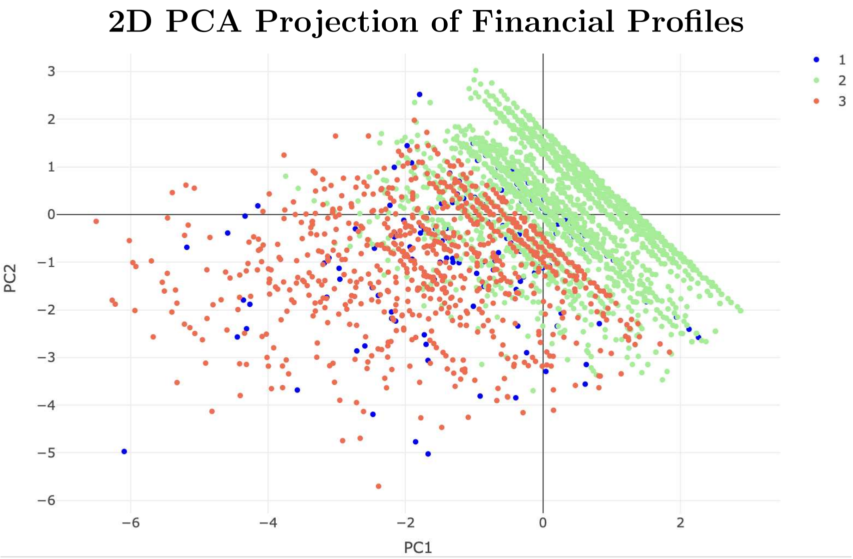


Figure 7.3: 2D PCA projection of clustered individuals. The separation between clusters is visible but partially overlapping, especially between clusters 2 and 3.

The figure reveals that clusters are not perfectly linearly separable in this two-dimensional space, but they do exhibit structure. Cluster 2 (light green) is spread broadly across the upper-right quadrant, while cluster 3 (red) is denser in the lower-left region. Cluster 1 (blue), the smallest group, appears more dispersed and somewhat intermingled with the others, suggesting that it represents a minority with diverse traits not captured by just the first two principal components.

3D PCA Projection.

To further explore the separation between clusters, we also visualize the first three principal components in three-dimensional space, as shown in Figure 7.4.

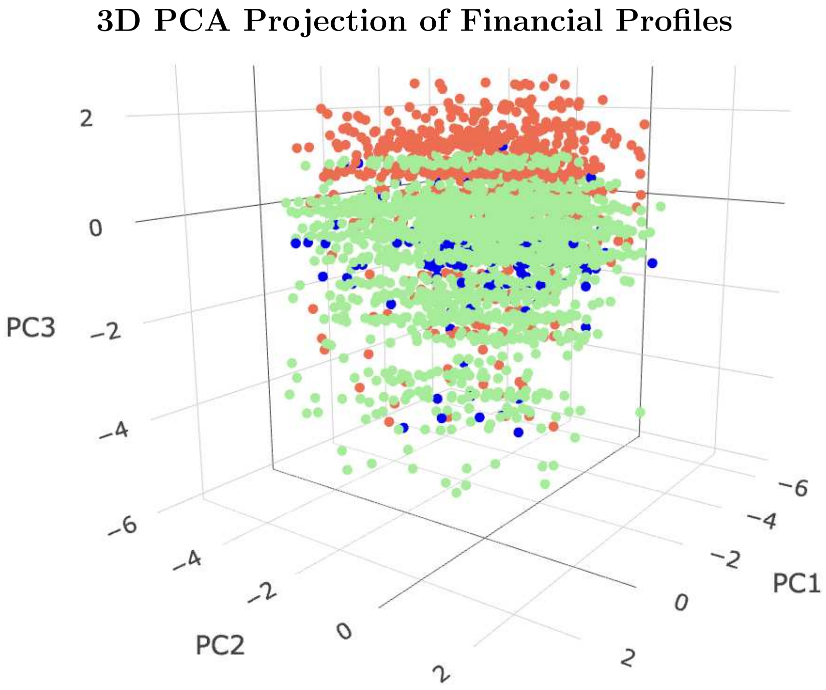


Figure 7.4: 3D PCA plot showing individuals by cluster using the first three principal components. The spatial separation across all three dimensions gives a more nuanced view of clustering structure.

This 3D projection helps better distinguish cluster 1 (blue), which appeared blended in 2D, but shows clearer stratification when PC3 is added. It also highlights how cluster 2 (light green) forms a more compact and elevated layer along the third principal component, while cluster 3 (red) remains concentrated in a separate zone.

Together, these PCA plots provide a visual confirmation of the clustering results: the identified groups occupy distinct, albeit overlapping, regions of the multidimensional behavioral space. This supports the idea that the clusters capture meaningful differences in financial behavior and literacy, even if complete linear separation is not feasible.

7.3 Interpreting the Investor Typologies

The k-means clustering algorithm identified three distinct behavioral profiles among Italian adults based on their investment patterns, financial and digital literacy, and risk attitudes. These clusters do not merely reflect differences in product ownership, but instead represent broader typologies of financial engagement. In what follows, we interpret each cluster in light of their average characteristics.

Cluster 1 – Cautious Traditionalists (149 individuals)

This group, the smallest among the three, is characterized by moderate participation in traditional financial instruments such as investment funds (18.8%), bonds (21.5%), and pension funds (26.8%). Insurance ownership is relatively high (33%), and notably, all individuals in this group reported owning cooperative loans possibly an artifact of the data imputation process, though it may reflect a niche community-finance segment.

Their financial literacy (FL = 10.9) and digital financial literacy (DFL = 4.7) are close to the population average, while their risk aversion is relatively high (mean = 3.17), suggesting a preference for secure and familiar financial products. These individuals appear to be moderately engaged, financially cautious, and inclined toward traditional, lower-risk instruments.

Cluster 2 – Financially Passive (3,834 individuals)

This is the largest group by far, and represents individuals with minimal financial market engagement. Nearly all investment variables are near-zero: no ownership of stocks, bonds, investment funds, or pension schemes. Insurance ownership is also low (19%), and cryptocurrency participation is the lowest of all groups (3.6%).

These individuals also show the highest level of risk aversion (mean = 3.23), alongside the lowest financial (FL = 10.8) and digital financial literacy scores (DFL = 4.5). In essence, this cluster captures the financially disengaged segment of the population likely reflecting individuals with lower financial confidence, limited access, or general distrust in financial institutions.

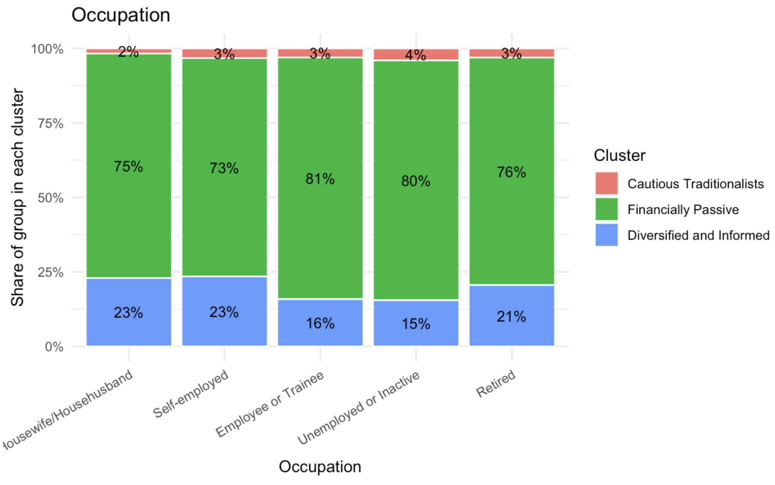
Cluster 3 – Diversified and Informed (879 individuals)

The third cluster represents a more financially active and diversified group. These individuals report the highest ownership rates for nearly all traditional financial products: investment funds (26.7%), stocks (56.4%), bonds (63.6%), and pension funds (22.6%). They also show moderate engagement with crypto assets (6.3%) and ESG investments.

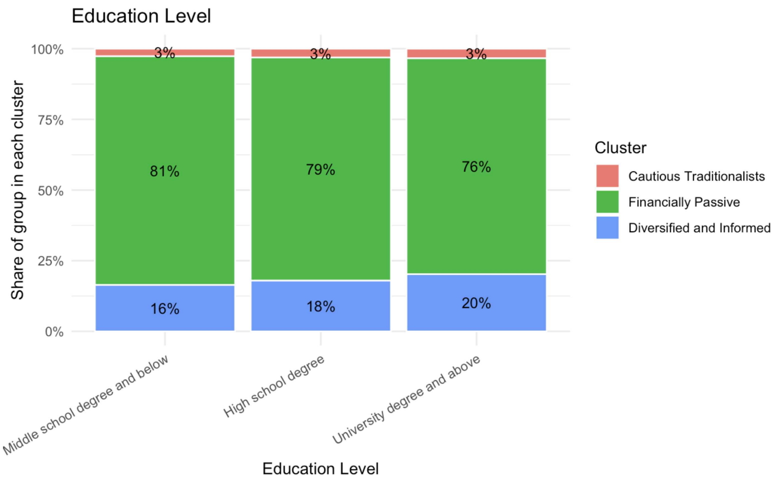
Their financial literacy (FL = 11.3) and digital financial literacy (DFL = 4.6) are the highest among the three groups, and their risk aversion is slightly lower (mean = 3.12), though still indicating cautious behavior. This cluster appears to represent financially literate individuals with a well-diversified portfolio, actively participating in both traditional and digital markets.

These clusters illustrate the heterogeneity of financial engagement in Italy. The Financially Passive group makes up the majority of the population, highlighting a widespread disengagement from investment products. At the opposite end, the Diversified and Informed cluster shows how higher literacy and slightly lower risk aversion correlate with broader financial participation. Finally, the Cautious Traditionalists represent a middle path, moderate financial involvement however mostly in secure, lower-volatility instruments.

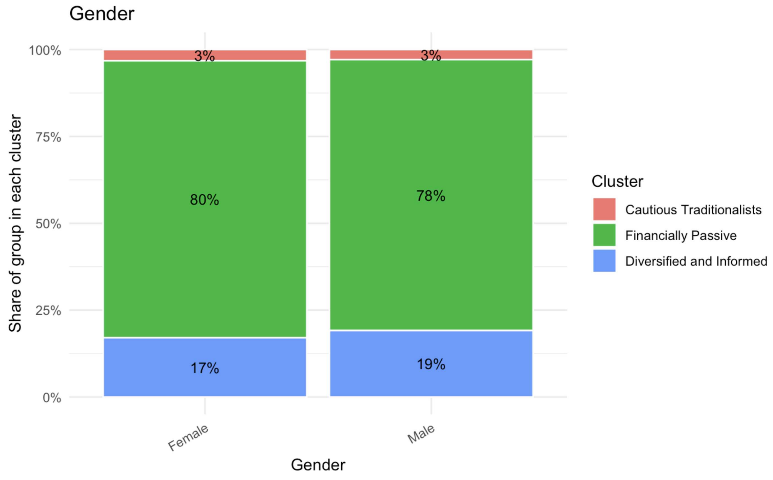
To further understand the characteristics of each cluster, we examine their demographic and socioeconomic profiles across six key dimensions: occupation, education, gender, age, income, and geographical area. The following visualizations display, for each group, the share of individuals assigned to each cluster. This approach allows us to assess how different segments of the population are distributed across the Cautious Traditionalists, Financially Passive, and Diversified and Informed investor types, thereby highlighting patterns of financial behavior embedded within broader social and economic structures.



(a) Occupation

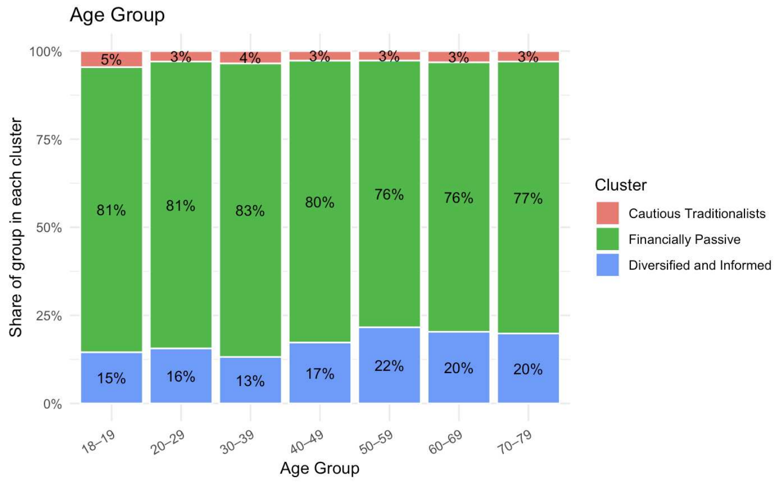


(b) Education Level

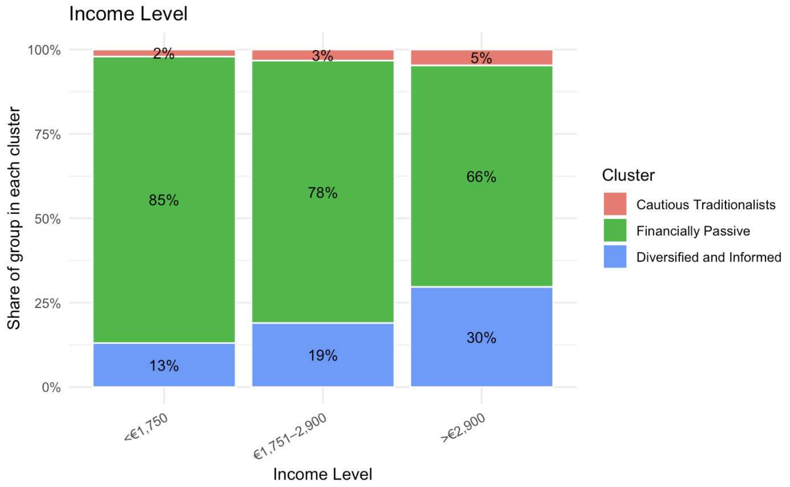


(c) Gender

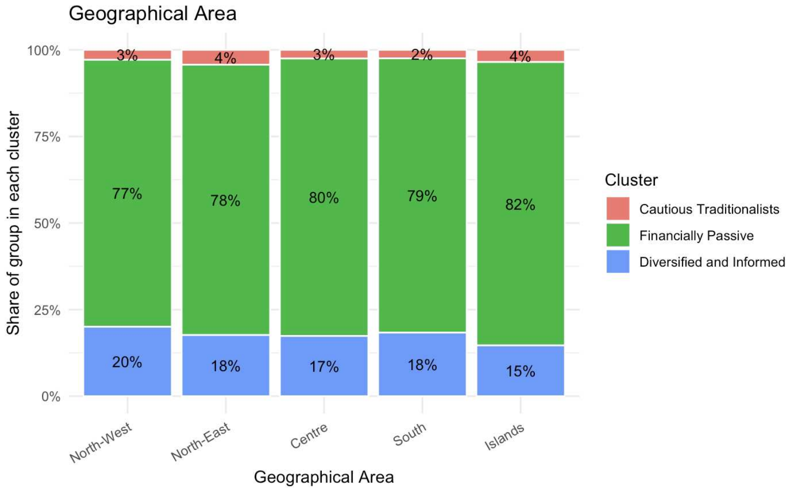
Figure 7.5: Distribution of occupation, education, and gender across clusters.



(d) Age Group



(e) Income Level



(f) Geographical Area

Figure 7.6: Distribution of age, income, and geographical region across clusters.

Figures 7.5 and 7.6 display the distribution of six key demographic and socioeconomic variables: occupation, education, gender, age group, income, and geographical area across the three investor clusters identified in the analysis, the Cautious Traditionalists, the Financially Passive, and the Diversified and Informed investors. Each plot is structured with the different response categories of a given variable along the horizontal axis, while the vertical bars represent the composition of that group in terms of cluster membership. The colored segments within each bar indicate the proportion of individuals in that demographic category who fall into each cluster. This visualization allows for a clear comparison of how various population subgroups are distributed across the three financial behavior profiles.

Several notable patterns emerge. In terms of occupation (Figure 7.5a), the Financially Passive cluster is the most prevalent across all employment categories. It comprises 81% of employees and 80% of unemployed individuals, indicating a widespread tendency toward financial disengagement within the working-age population. Interestingly, the Diversified and Informed cluster appears more prominently among retirees (27%) and self-employed individuals (11%), suggesting that financial activity and diversification may increase with either accumulated experience or entrepreneurial responsibility. The Cautious Traditionalists are marginal in all employment groups, never exceeding 4%.

When looking at education level (Figure 7.5b), a modest but consistent trend emerges. The share of Diversified and Informed individuals rises slightly with education, accounting for 16% of those with only a middle school education, 19% of high school graduates, and 20% of those holding a university degree. Nevertheless, the Financially Passive cluster remains dominant even among the most educated respondents, reflecting the broader passivity observed throughout the population.

Gender (Figure 7.5c) exhibits minimal variation across clusters. Both male and female respondents are largely concentrated in the Financially Passive group (approximately 78–80%), while the Diversified and Informed make up around 18–19% in both cases. The Cautious Traditionalists are slightly more represented among men (3%) than women (2%), but overall, gender does not appear to play a major role in shaping cluster membership.

Looking at age group (Figure 7.6a), younger individuals, particularly those aged 18–29, show a slightly higher share of Cautious Traditionalists (up to 5%), possibly reflecting cautious early engagement with financial instruments. However, the Financially Passive cluster is again predominant across all age groups, including older individuals. The Diversified and Informed cluster becomes slightly more common among middle-aged and older adults (especially between ages 40 and 59), possibly indicating greater financial awareness or capacity to diversify their portfolio with age and experience.

Income level (Figure 7.6b) reveals a clearer gradient. Among individuals earning more than €2,900 monthly, 30% belong to the Diversified and Informed cluster. This share drops to 23% among those earning €1,751–2,900 and further to just 13% for those earning less than €1,750. Conversely, the Financially Passive group dominates lower-income brackets (83% for the lowest group) and becomes less prominent as income increases. This pattern strongly suggests a correlation between financial activity and economic resources.

Finally, geographical location (Figure 7.6c) reflects well-documented regional disparities within Italy. The Financially Passive cluster is particularly concentrated in the South and Islands, where it accounts for over 80% of individuals. In contrast, the Diversified and Informed are relatively more common in the North-West (20%) and North-East (18%), areas typically associated with higher financial literacy, better infrastructure, and greater economic opportunities.

Overall, these graphs reveal that while the Financially Passive profile dominates across the population, there are consistent and meaningful variations by socioeconomic status and geography. Higher education, income, and residence in Northern Italy are associated with a greater likelihood of belonging to the Diversified and Informed cluster, while youth and lower income correspond slightly with the Cautious Traditionalist profile. These findings underscore the importance of structural factors in shaping financial behavior.

Chapter 8

Conclusion

This thesis was set out to investigate the interplay between financial literacy, digital financial literacy, and individual financial behavior among Italian adults. Drawing on microdata from the 2023 IACOFI survey, the analysis explored how these forms of literacy correlate with participation in various financial products and services like voluntary insurance, pension funds, traditional portfolio choices, and cryptocurrency ownership. The findings confirm many established patterns in the literature, such as the importance of traditional financial literacy in shaping informed financial behavior, while also revealing newer insights into the role of digital financial competencies. However, perhaps the most persistent and concerning theme that emerges across the data is the stark gender disparity that reoccurs in every domain of financial knowledge and engagement.

Across the sample, women consistently score lower than men in both financial and digital financial literacy. They also participate less in nearly all financial activities investigated, including those widely considered crucial for long-term financial well-being, such as pension contributions and insurance coverage. These gaps are not simply the result of observable differences in age, education, employment, or income. Even when these factors are held constant, a gender gap remains, suggesting that the issue runs deeper than individual characteristics and reflects more systemic roots.

To understand these disparities, one must look beyond the data and consider the historical and cultural contexts in which financial knowledge has been developed and disseminated. For much of history, women were systematically excluded from formal education and financial participation. In Italy, women only gained universal access to higher education in the second half of the 20th century. Even today, the share of women enrolled in economics, finance, and STEM fields remains disproportionately low. These patterns are not isolated to education, they reflect a broader societal tendency to associate financial competence with masculinity, while women are often conditioned to be cautious, risk-averse. However, the most severe issue is that women are still being conditioned to be dependent when it comes to money matters, which might be the most dangerous aspect of this whole problem. Financial literacy equals independence, meaning, having the freedom to shape one's life on personal terms, rather than having circumstances dictated by financial necessity.

These narratives are self-reinforcing. When women are underrepresented in finance-related disciplines, they have fewer opportunities to build expertise and confidence in those areas. When few women occupy leadership roles in finance, economics, or policymaking, others are less likely to envision themselves in such positions. When textbooks and curricula ignore the financial lives of women, or when financial education is offered only to those who actively choose it in university, the structural inequalities persist.

Financial literacy, then, is not just a matter of knowledge, it is about power, access, and inclusion. The very ability to understand and navigate financial systems can open or close doors to opportunity, economic security, and independence. And when large portions of the population, especially women lack this access, the consequences are far-reaching: greater vulnerability to financial shocks, lower retirement preparedness, reduced household resilience, and intergenerational cycles of disadvantage.

Education, in this light, becomes both the problem and the solution. The findings of this thesis reaffirm that education is one of the strongest and most consistent predictors of financial literacy. Individuals with higher levels of education score better in both traditional and digital literacy metrics, and they are more likely to engage with a range of financial products. Yet in Italy, the proportion of adults with a university degree remains strikingly low, just around 20%, well below the EU average. This means that financial illiteracy is not confined to the margins; it is a systemic issue that affects a large share of the population.

Addressing this requires bold and sustained policy action. First, the Italian government must commit to expanding access to education beyond the high school level. This is not only a matter of funding universities or increasing enrollment quotas. It means reducing the financial, geographic, and cultural barriers that prevent young people, especially those from underrepresented groups, from pursuing advanced education. Scholarships, transportation support, flexible programs, and community outreach are all necessary tools in this regard.

Second, financial education should not be a niche topic reserved for economics students or business schools. It should be mainstreamed into the national curriculum starting in middle school and reinforced at every educational level. Students should learn not only about saving and interest rates, but also about insurance, retirement planning, digital security, and investment risks. These are life skills, not technical specialties. Crucially, these programs must be designed with inclusivity in mind. Gender-sensitive pedagogies, diverse examples, and the dismantling of financial stereotypes are essential to ensure that both boys and girls feel equally capable of mastering financial knowledge.

Third, more effort is needed to promote women's participation in finance, economics, and STEM fields, both in education and in the labor market. This involves creating targeted incentives for female enrollment in quantitative disciplines, supporting mentorship networks, and highlighting female role models in academia and industry. Companies and institutions should be encouraged or required to collect and publish gender-disaggregated data on hiring, promotion, and pay in financial roles. Transparency is a necessary step toward accountability.

The importance of representation cannot be overstated. When women are visible in leadership roles on bank boards, in investment firms, in central banks, and in financial media they challenge the implicit norms that suggest finance is a male domain. They also bring new perspectives, priorities, and styles of decision-making to institutions that have long operated within a narrow cultural framework. Financial systems benefit from diversity not just ethically, but economically.

The digital dimension adds another layer of complexity and urgency. As financial services increasingly move online, digital financial literacy becomes a prerequisite for full participation in the economy. Yet here too, women often lag behind not necessarily in access to technology, but in confidence and usage patterns. The DFL data from IACOFI confirms that digital behavior is lower among women even when access is not a barrier. If this gap is not addressed, there is a risk that digitization will widen, rather than reduce, existing inequalities.

To prevent this, digital skills training must be embedded in adult education, workforce development, and community outreach programs. Libraries, schools, unions, and social service providers can all play a role in building digital financial competencies. These initiatives should be tailored to different life stages and contexts whether it be young adults managing their first paycheck, mid-career workers navigating mortgage options, or older adults confronting online fraud.

Finally, financial literacy should be framed not only as an individual responsibility, but as a public good. When people understand their financial rights and options, they are less likely to fall victim to fraud, more likely to save for retirement, and more capable of making informed policy decisions as voters. These outcomes benefit society as a whole. Just as governments invest in public health or transportation infrastructure, they must also invest in financial capability not through one-off campaigns, but through integrated, long-term strategies.

In conclusion, this thesis has shown that financial literacy both traditional and digital is essential for navigating modern economic life, but that access to such knowledge remains unequally distributed. Gender disparities are deeply rooted and structurally maintained, while low overall education levels compound the problem. Solving these challenges requires systemic thinking, cross-sector collaboration, and political will. The solutions are neither simple nor immediate, but they are possible.

By embedding financial education into public policy, creating inclusive pathways to higher education, and actively promoting gender equity in finance and beyond, Italy can take meaningful steps toward a more financially literate, resilient, and just society. The task is urgent, the stakes are high, and the potential for positive transformation is immense.

Appendix A

OECD/INFE Overview of Questions and Score Construction Methodology

Annex A. Overview of questions and scores

Overview of questions

The questionnaire in this toolkit has been updated since the previous international studies were published.[7] The table below is intended to help users of the current questionnaire to prioritise the choice of questions, and track changes with respect to previous versions.

Table A A.1. Summary of questions

Question number	How/whether this question has been used in previous OECD studies	Information collected	Additional information	Creating financial literacy scores
QD1	Demographic variable	Gender		
QD2		Region	Useful for country level analysis	
QD3	Explanatory variable	Size of settlement	The size of the settlement can make a difference to access to services, including financial services. Previous versions of this question asked about the usual community, but the question has been simplified following feedback	
QD4		The language of the interview	Differences by language may indicate inequalities and identify whether there is a need to develop financial education in various languages	
QD5, QD5_ad,	Demographic variable	Household composition	National institutions using the questionnaire may wish to add additional	

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[7] OECD/INFE 2020 International Survey of Adult Financial Literacy https://www.oecd.org/financial/education/oecd-infe-2020-international-survey-of-adult-financial-literacy.pdf

Question number	How/whether this question has been used in previous OECD studies	Information collected	Additional information	Creating financial literacy scores
QD5_ch			questions to explore the *financial* relationships between household members	
QD14	New question	Access to Internet	Depending on the data collection method, the question can be used to filter subsequent questions or create weights.	
QF1_a	Used to create the budgeting variable	Day to day financial decision making	Question that takes into account people who take care of their own money but not that of their household	Financial literacy score - Financial behaviour: 1 point if personally or jointly responsible for money management [QF1='1' or 2 OR QF1_a='1]' AND actively keeping track of money [at least 2 Yes responses on QF2]. 0 in all other cases.
QF1	Used to create the budgeting variable	Day to day financial decisions of the household	To identify those who take responsibility for financial decisions	
QF2	Used to create the budgeting variable	Various behaviours that are related to budgeting	Actively keeping track of money	
QF3	Used to create the active saving variable. Minor edits with respect to the 2018 Toolkit, the computation of the score is not affected.	Various forms of active saving	Allows the respondent to identify a range of ways in which they are exhibiting saving behaviour.	Financial literacy score - Financial behaviour: 1 point for any type of active saving (answers yes to any option including any relevant options added at the national level). 0 in all other cases.
QF4		Financial resilience in the face of an expenditure shock –at the time of interview	Indicates access to existing resources for an unexpected expense and may be an aspect of financial well-being	
QF4pre	New question	Financial resilience in the face of an expenditure shock – before COVID-19	New optional question for countries that have not participated in the 2019/2020 OECD INFE survey and that would like to compare the results of QF4 with the pre-COVID19 situation	
QF5	Used in additional analyses	Goal setting	Identifies people that have one or more financial goals, either alone or with their partner	
QF6		Most important goal	This question could be useful when designing financial education programmes targeted to specific needs	
QF7	Used in additional analyses. Small edit in the body of the question, to clarify that the question is about financial goals	Action to meet a goal	Identifies the types and combination of actions taken to meet a goal. The question is intended to identify the	

Question number	How/whether this question has been used in previous OECD studies	Information collected	Additional information	Creating financial literacy scores
			behaviour of the respondent	
QF8	Used in additional analyses	Confidence that retirement plans are adequate	Creates a simple indicator of the level of confidence that the respondent is/will be comfortable in retirement	
QF9	Clarifications added in the note to interviewers	Method of funding retirement	Identifies the types and combination of actions taken to fund retirement. Useful when designing financial education programmes and analysing national trends. Countries may wish to reorder, or add new codes	
QF10	*Does not exist anymore. It included behaviour and attitudes statement in the 2015 Toolkit*			
QF11	Used to filter respondents to QF12	Making ends meet	This question is used as a filter to find out how people manage a shortfall	
QF12	Used to create the borrowing to make ends meet variable	Approach taken to making ends meet	One response option was added with respect to the 2018 Toolkit (Use someone else's credit card) The various responses are used to create a variable that identifies people who borrowed to make ends meet	Financial literacy score - Financial behaviour. This variable takes the value of 0 if the respondent borrowed to make ends meet and 1 if the respondent did not borrow to make ends meet or did not face a shortfall. Specifically, it takes a value of 0 if the respondent answered Yes at any _3 [Access credit by using existing contacts or resources] or any _4 [Borrow from existing credit line] or any _5 [Access additional credit] or any _6 [Fall behind] or other country specific responses indicating that he/she used credit to make ends meet. 1 point is awarded in all other cases. Note that this means that missing data will therefore result in 1 point on this measure. This approach assumes that the % of missing data is small.
QF13		Financial resilience in the face of an income shock –at the time of interview	Indicates flexibility in the face of an income shock and may be an aspect of financial well-being. Note that the previous version of this question asked about the household, but this was not relevant to all respondents	
QF13pre		Financial resilience in the face of an income shock – before COVID-19	New optional question for countries that have not participated in the 2019/2020 OECD INFE survey and that would like to compare the results of QF13 with the	

Question number	How/whether this question has been used in previous OECD studies	Information collected	Additional information	Creating financial literacy scores
			pre-COVID19 situation	
QP1	Used as a measure of financial inclusion; and used as a filter for QP2 and QP3. The name of the variable has changed (it was Qprod1_a in the 2018 Toolkit). One response option was added (products labelled as ESG or sustainable)	Financial product awareness	Awareness is considered to be an important aspect of inclusion. **Edits should be made to ensure that the list of products provides relevant data at the national level**	Financial literacy score - Financial behaviour: The variable choosing products is constructed by creating two intermediate variables, and then creating a derived variable. Country specific responses can also be coded. The two intermediate variables are the following: 1. QP_D1: Tried to compare across providers taking value of: 1 if variable QP5 is equal to 1 or 4 (I considered several or I looked around but there were no others), and 0 otherwise. Note that 0 includes no recent product choice/not applicable. 2. QP_D2: Sought information or advice taking values • 2 if yes at any of QP7_1 or QP7_2 or QP7_3 (Best-buy guidance / Price comparison website / Recommendation from independent financial adviser) • 1 if yes at any of QP7_4, QP7_5, QP7_6. or QP7_7 (information from an advert or brochure, recommendation from friends etc., information from bank staff, or other information • 0 otherwise. Note that 0 includes no recent product choice. The final variable Qb7_new Tried to shop around or use independent info or advice takes the following values: • 2 if QP_D2 =2. The value of 2 indicates Used independent info or advice • 1 if QP_D1 =1 or QP_D2 =1. The value of 1 indicates Some attempt to make informed decision • 0 Otherwise. The value 0 indicates 'Not shopped around and no attempt to make informed decisions (including no recent product choice).
QP2	Used to create variables of product holding as an indicator of financial inclusion. The name of the variable has changed (it was Qprod1_b in the 2018 Toolkit). One response option was added (products labelled as ESG or sustainable)	Product holding		
QP3	Used as filter to find out about financial product choice. The name of the variable has changed (it was Qprod1_c in the 2018 Toolkit). One response option was added (products labelled as ESG or sustainable)	Product choice		
QP4	The name of the variable has changed (it was Qprod1_d in the 2018 Toolkit).	Most recent product	This question may be useful for national analyses, to explore whether product choice behaviour depends on the product being chosen. It is not used in international comparisons	
QP5	Used to create a variable on product choice behaviour. The name of the variable has changed (it was Qprod2 in the 2018 Toolkit).	How the most recent product choice was made	This question is intended to show whether people are shopping around for financial products	
QP6	Question to further explore product choice. The name of the variable has changed (it was Qprod2_a in the 2018 Toolkit).	Question to explore aspects of the importance of the company	The options are intended to highlight the relevance of speed, trust and customer loyalty	
QP7	Used to create the product choice variable. The name of the variable has changed (it was Qprod3_INT in the 2018 Toolkit).	Short question about the information that influenced the most recent product choice decision		
QP8	New question about use of digital financial	Information about using	This question focuses on actions related	

Question number	How/whether this question has been used in previous OECD studies	Information collected	Additional information	Creating financial literacy scores
	services	digital financial services	to digital financial services that are not carried out often, such as opening accounts or taking out credit.	
QP9	New question about use of digital financial services	Information about using digital financial services	This question focuses on actions related to digital financial services that are carried more often	
QP10	The name of the variable has changed (it was Qprod4 in the 2018 Toolkit). Item _2 was edited and one item was added (about being denied credit)	Information about issues related to financial product use	This question provides information that could be used to inform financial education and financial consumer protection policy	
QS1	Some items were dropped because they are covered elsewhere. Item _3 (Money is there to be spent, has become optional).	Various statements that are designed to indicate attitudes and behaviours	Statement 1 and 3 go into the attitude score. Statement 4, 7 and 10 are included in order to explore financial well-being (but are not part of the CFPB score) Statement 5 and 8 are included in the financial behaviour score	Financial literacy score - Financial behaviours: • I keep a close personal watch on my financial affairs: 1 point for respondents who put themselves at 1 or 2 on the scale [agrees]. 0 in all other cases. • I set long term financial goals and strive to achieve them: 1 point for respondents who put themselves at 1 or 2 on the scale [agrees]. 0 in all other cases. Financial literacy score - Financial attitude: I find it more satisfying to spend money than to save it for the long term (and Money is there to be spent, if it asked). Recoded so that invalid responses (-97, -98 and -99 are equal to 3)
QS2	New items were added (Statements 6 to 11)	Various statements that are designed to indicate attitudes and behaviours	Statement 1, 2 and 4 are included in order to explore subjective financial well-being. Statement 3 and 5 are included in the financial behaviour score. New statements: Statement 6 to 8 are about digital financial literacy Statement 9 is about sustainability Statement 10 is about over-consumption	Financial literacy score - Financial behaviours: • Before I buy something I carefully consider whether I can afford it: 1 point for respondents who put themselves at 1 or 2 on the scale [always]. 0 in all other cases. • I pay my bills on time: 1 point for respondents who put themselves at 1 or 2 on the scale [always]. 0 in all other cases. Digital financial literacy – behaviour: • I share the passwords and PINs of my bank account with my close friends: 1 point for respondents who put themselves at 4 or 5 on the scale [never]. 0 in all other cases. • Before buying a financial product online I check if the provider is regulated in my country: 1 point for

Question number	How/whether this question has been used in previous OECD studies	Information collected	Additional information	Creating financial literacy scores
				respondents who put themselves at 1 or 2 on the scale [always]. 0 in all other cases. • I share information about my personal finances publicly online (e.g. on social media): 1 point for respondents who put themselves at 4 or 5 the scale [never]. 0 in all other cases.
QS3	Some items were dropped because they are covered elsewhere.	Various statements that are designed to indicate attitudes and behaviours	Statements 4 to 8 are included to explore aspects of integrity Statements 3, 9, 10 and 11 are included in order to explore subjective financial well-being. Statements 13 to 15 are about digital financial literacy	Financial literacy score - Financial attitude: I tend to live for today and let tomorrow take care of itself Recoded so that invalid responses (-97, -98 and -99 are equal to 3) Digital financial literacy – behaviour: • I regularly change the passwords on websites that I use for online shopping and personal finance: 1 point for respondents who put themselves at 1 or 2 on the scale [completely]. 0 in all other cases.
QS4	New question	Various statements about attitudes related to digital financial services	Statements 1 to 3 are included in the digital financial literacy score. The other statements refer to attitudes and behaviours that are not part of the score.	Digital financial literacy – attitudes: • I think that it is safe to shop online using public Wi-Fi networks: 1 point for respondents who put themselves at 4 or 5 on the scale [disagree]. 0 in all other cases. • It is important to pay attention to the security of a website before making a transaction online: 1 point for respondents who put themselves at 1 or 2 on the scale [agree]. 0 in all other cases. • I think it is not important to read the terms and conditions when buying something online: 1 point for respondents who put themselves at 4 or 5 on the scale [disagree]. 0 in all other cases.
QS5	New question	Various statements about attitudes related to sustainable finance		
QK1	Compared with the financial knowledge score	Self-rated assessment of financial knowledge		
QK2		Division	Question to test basic numeracy. This is very easy in some countries, and therefore does not add value in a knowledge score	

Question number	How/whether this question has been used in previous OECD studies	Information collected	Additional information	Creating financial literacy scores
Qk3		Impact of inflation on spending power	Included in financial literacy score (knowledge)	Financial literacy score - Financial knowledge: 1 for correct responses [c, unless the country indicates otherwise; or d, if mentioned spontaneously]. 0 in all other cases.
QK4		Identification of interest	Included in financial literacy score (knowledge)	Financial literacy score - Financial knowledge: 1 for correct response [0]. 0 in all other cases.
QK5		Simple interest calculation	Included in financial literacy score (knowledge). This question has been slightly reworded since 2015 to say someone instead of you, in order to avoid implying that the respondent would consider an interest bearing account	Financial literacy score - Financial knowledge: 1 for correct response [102]. 0 in all other cases.
QK6		Understanding the implication of compounding	Included in financial literacy score (knowledge)	Financial literacy score - Financial knowledge: 1 for a correct response to QK6 if and only if the response to Calculation of interest plus principal (QK5) was also correct. 0 in all other cases.
QK7_1		Relationship between risk and reward	Included in financial literacy score (knowledge)	Financial literacy score - Financial knowledge: 1 for a correct response [1/True]. 0 in all other cases.
QK7_2		Definition of inflation	Included in financial literacy score (knowledge)	Financial literacy score - Financial knowledge: 1 for a correct response [1/True]. 0 in all other cases.
QK7_3		Risk diversification	Included in financial literacy score (knowledge)	Financial literacy score - Financial knowledge: 1 for a correct response [1/True]. 0 in all other cases.
QK7_4	New question	Understanding of digital contracts	Included in the digital financial literacy score (knowledge)	Digital financial literacy – knowledge: 1 for a correct response [0/False – this will be checked at national level in participating countries]. 0 in all other cases.
QK7_5	New question	Understanding of personal data use	Included in the digital financial literacy score (knowledge)	Digital financial literacy – knowledge: 1 for a correct response [1/True – this will be checked at national level in participating countries]. 0 in all other cases.
QK7_6	New question	Understanding of crypto-assets	Included in the digital financial literacy score (knowledge)	Digital financial literacy – knowledge: 1 for a correct response [0/False – this will be checked at national level in participating countries]. 0 in all other cases.
QD6	Modified question	Media use	This question can be useful to understand levels of familiarity with digital media and tools, and possibly to identify	

Question number	How/whether this question has been used in previous OECD studies	Information collected	Additional information	Creating financial literacy scores
			suitable delivery channels for financial education	
QD7		Age	If countries want to create different age categories, this question could be useful	
QD7_a	Demographic variable	Age	Categories should be kept the same for international comparisons	
QD8		Ethnicity	Ethnicity may be useful in analyses of vulnerability or inequality at the national level	
QD9	Demographic variable; updated to simplify and reflect international standard levels	Education level	Question wording and responses are different from those used in the 2015 Toolkit	
QD10	Demographic variable	Employment status (main)		
QD11		Employment status (additional)	Added to account for people with multiple roles, to be used in national analyses	
QD12		Place of birth	Added to indicate migrants in a similar manner to that used in PISA	
QD13	Demographic variable	Income level	Countries need relevant household statistics to create this variable	

Creating financial literacy scores

Financial knowledge score

The knowledge score is computed as the number of correct responses to the seven financial knowledge questions (QK3 to QK7_3). It ranges between 0 and 7. Data should be processed according to the instructions in Table A1 above to ensure that there are no missing, or invalid values.

Financial behaviour score

The behaviour score is computed as a count of the number of “financially savvy” behaviours relating to budgeting (QF1 and QF2), active saving (QF3), avoiding borrowing to make ends meet (QF11 and QF12) choosing products (various QP questions are used, creating two points on this score), keeping watch on financial affairs (QS1), striving to achieve goals (QS1), making considered purchases (QS2), paying bills on time (QS2). It ranges between 0 and 9. Data should be processed according to the instructions in Table A1 above to ensure that there are no missing, or invalid values.

Financial attitudes score

The attitude score is computed as the average response across two attitude questions: i.e., the sum of the values for the three statements divided by two (after recoding to account for values -97, -98 and -99 as mentioned above). If the statement “Money is there to be spent” is asked in a given country, the average will be computed over the three statements. The average obtained should be rescaled to range from 0 to 4 (instead of from 1 to 5). The attitudes score, therefore, ranges from 0 to 4.

Overall financial literacy score

The overall financial literacy score is obtained as the sum of the three previous scores: financial knowledge (7), financial behaviour (9) and financial attitudes (4). It can take any value between 0 and 20. If required, it could be normalised to 100 for reporting by multiplying by 100/20.

- Institutions and researchers comparing data collected with the 2022 version of the toolkit with previous data should take into account: Starting from the 2015 version of the Toolkit, question QK2 became optional. Comparisons of older data with data collected with the 2012 toolkit should be computed without QK2.
- Starting from the 2022 version of the Toolkit, the attitudes score is scaled to range from 0 to 4 (for consistency with the other behaviour and knowledge components). This means that the overall financial literacy score ranges from 0 to 20. Comparisons with older data should take this into account and recompute previous scores applying the same rescaling.
- Starting from the 2022 version of the Toolkit, the statement “Money is there to be spent” became optional. Comparisons with older data should exclude this statement.

Digital financial literacy score

Knowledge

The knowledge component of the digital financial literacy score is computed as the number of correct responses to the three questions (QK7_4, QK7_5, QK7_6). It ranges between 0 and 3. Data should be processed according to the instructions in Table A1 above to ensure that there are no missing, or invalid values.

Behaviour

The behaviour component of the digital financial literacy score is computed as a count of the number of "savvy" behaviours elicited by four statements (three in QS2 and one in QS3). It ranges between 0 and 4. Data should be processed according to the instructions in Table A1 above to ensure that there are no missing, or invalid values.

Attitudes

The attitudes component of the digital financial literacy score is computed as a count of the number of "savvy" attitudes elicited by three statements in QS4. It ranges between 0 and 3. Data should be processed according to the instructions in Table A1 above to ensure that there are no missing, or invalid values.

Overall score

The overall digital financial literacy score is obtained as the sum of the three previous components: knowledge (3), behaviour (4) and attitudes (3). It can take any value between 0 and 10. If required, it could be normalised to 100 for reporting by multiplying by 100/10.

Financial inclusion indicators

Financial inclusion indicators can be created by drawing on various questions, as described in Table A2.

Table A A.2. Computing financial inclusion indicators

Indicator	Question number	Discussion	Method used
Holds payment product	QP2	Identifies payment products across country level data, such as prepaid cards, current accounts etc.	Binary variable: takes value of 1 if any payment product is held, otherwise 0
Holds savings, investment or retirement product	QP2	Identifies savings, investment and retirement products across country level data, such as pensions, investment accounts, savings accounts. savings clubs, bonds, crypto-assets etc.	Binary variable: takes value of 1 if any savings, investment or retirement product is held, otherwise 0
Holds insurance	QP2	Identifies insurance products across country level data, such as car insurance, home insurance, etc.	Binary variable: takes value of 1 if any insurance product is held, otherwise 0
Holds credit product	QP2	Identifies credit products across country level data, such as mortgages, credit cards, microloans etc.	Binary variable: takes value of 1 if any credit product is held, otherwise 0
Aware of at least 5 products	QP1	Counts all positive responses across QP1	Binary variable: takes value of 1 if at least five positive responses, otherwise 0
Recent financial product choice	QP3	Identifies individuals that have made at least one product choice	Binary variable: takes value of 1 for any recent choice, otherwise 0
Relying on family and friends	QF3 and QF12	Identifies people who turn to family or friends to save money for them, or to help them to make ends meet	Binary variable: takes value of 1 if saving through family and friends **or** turning to family and friends to make ends meet, otherwise 0

Note: Additional R scripts and full source code used for this analysis are available upon request. Please contact the author directly to obtain access.

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